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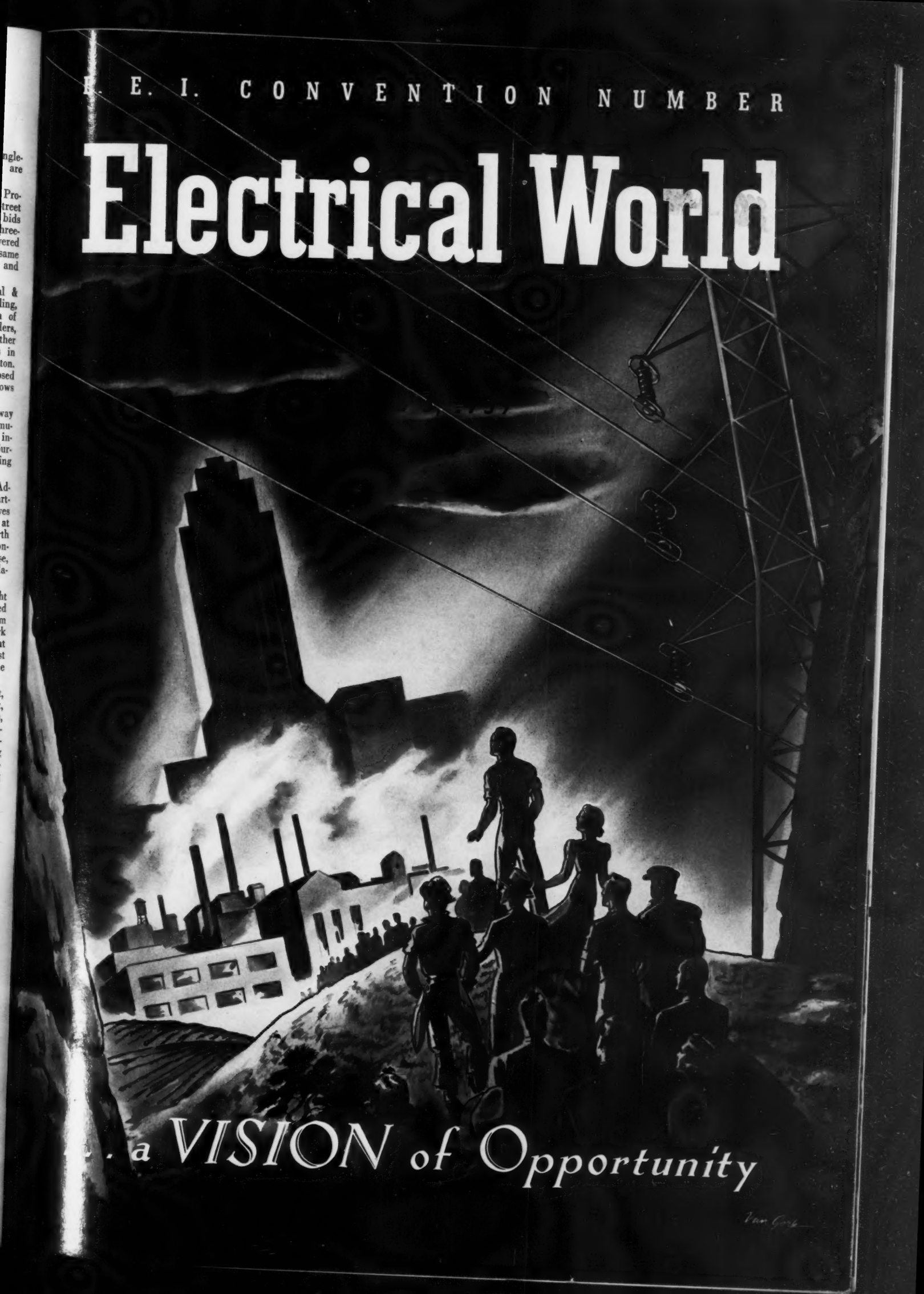
Electrical World



. . a VISION of Opportunity

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A Vision of Opportunity

Opportunity springs from problems—from things needing to be done. Without the one, the other cannot be. On this reasoning the electric utility business abounds with opportunity in every field of its activity.

Every one agrees that the electric utilities are in a tough spot. The trouble began ten or more years ago with the Walsh resolution calling for an investigation of the industry. And for the past six or seven years it has been abused, seemingly with great and malicious pleasure, by politicians in power.

The electric utilities have felt the tremendous strength of government in money and in influence vindictively used against them. Taxes piled on taxes have weighted them down. The threat of destructive government competition has been present every moment. The red tape of oppressive regulation has hampered and hindered their every move. Official snoopers have ferreted out errors of the past and present and violently distorted propaganda has held the industry up before the nation as a monster of greed and evil purpose. A man wrapped now in the robes of dignity of the Supreme Court, then standing in the hardly lesser dignity of the senatorial toga, stridently proclaimed he would rather enter a den of rattlesnakes than go into a utility holding company office. That remark typifies the animosity of government that has been and is still being directed against the electric utilities.

Since 1932 the electric utility industry has been under this kind of attack. For these six and more years it has been harassed, bedeviled and bedamned.

And yet today the industry has more friends among the people than it had in 1932. The violence of political animosity against the utilities is beginning to defeat itself, as unrestrained vindictiveness always does. This reaction is becoming clearer and clearer in public attitudes as they appear in the results of elections and in other channels through which the voice of the people is heard.

Although business generally is still well below the peak of 1929 in production, the annual output of electricity long ago exceeded the figure for that year, and is now higher than ever before. In spite of countless and deep rate reductions, revenue this year is hitting new high seasonal levels.

Is this the record of an industry that is static, that is being throttled, that offers no opportunity?

No. The record shows, instead, an industry that has kept on growing in spite of sustained and manifold efforts to stunt and cripple it. The record shows an industry whose virility and strength derive from universal need and desire for its service. The record shows an industry that is too strong to be killed by political antagonism, that is solidly founded in the American way of life and that is worthy of the enthusiasm of young men.

The problems and difficulties that today beset the electric utilities, viewed through the eyes of enterprise, are not obstacles, but opportunities, things to be done. In all three of the major aspects of the situation, public relations, commercial and technical, there are many things waiting to be done, many problems that urgently demand solution—opportunities galore for men and women who have courage to think away from the past, who look from new viewpoints, who are enterprising and venturesome.

The trends of output and of service expansion of the industry have been strongly upward in these recent trying years. The next decade promises an output nearly double the record high of all the preceding years of the industry's history. And those earlier years were thought to be times of opportunity. What are the problems of the ten that will compress into their short term a growth equal to that of the past fifty-seven?

Let us take a quick look at some of the opportunities in the electric utility industry that beckon today to people of ambition, vision and initiative.

Employee and public relations built on the basis of mutual understanding and confidence:

Under this broad heading come a host of small detailed problems concerning relations with personnel and with customers. Prevention of public ownership raids, warding off of unfair demands and legislation, limitation of excessive taxation are the results of intelligent work done in this field.

Improved efficiency in operation:

While the room for improvement in production efficiency is constantly becoming smaller, there still is great opportunity for simplification and for mechanization of routine operations.

Improved service at less cost:

The great cost today is the element of fixed charge per unit of sale. Anything that can lower the investment cost without impairing service will be helpful to the industry as a whole.

Improved net profit per unit of sale:

More important, perhaps, than reducing costs of operation is to spread a larger volume of sales over the same costs. It means selling the maximum amount of load with the minimum of investment. It involves the whole problem of market research, unreached markets, small-use customers, competition, large loads at low rates, and many others.

Solution of these and other basic problems will come through the solution of their innumerable constituent problems. As these problems are solved, the utilities will prosper and grow.

Problems, troubles, difficulties, are not obstacles that encompass man about and wall him in to suffocate and die. They are the stone of which he builds his edifice of accomplishment. And by that work of building, man grows in stature and in strength, rising with his accomplishment to heights far above his previous level. So will it be with the electric utility industry. Converting problems into opportunities, error into truth and harm into benefit, it will build itself up to higher and higher estate in service to the people of this nation.

"Energy in Release"
Prize Contest Entry by
J. K. Cochran Monongahela-West Penn Public Service Company

The Strength That Comes From Adversity

The industry is now the master of the situation; it has learned the way out; it need fear no one but itself—the public now is with it

WENDELL L. WILLKIE, ***President Commonwealth & Southern Corporation as told to***
S. B. WILLIAMS, ***Editor "Electrical World"***

THIS FALL marks the tenth anniversary of the crash in the stock market, which, for the majority of the people, was but the visible evidence of the beginning of the great depression. The roots of that depression were laid, economists tell us, in the destruction of the World War, which was followed by excesses of one kind or another during the boom years of the '20s. Without attempting to fix the blame, even if that could be done, it is enough to say that public confidence in American business judgment, and in American business leadership, received a severe jolt.

Because our business, industrial and governmental leaders were unable to stem the downward trend of business which resulted in increasing distress from unemployment, the American people voted for a program of government regulation of business and social adjustments. Prominent in that program was a new form of regulation of public utilities—regulation by government competition, both direct and through subsidy.

No other industry was singled out for such a ramified and intensified attack as the electric utilities. Rates were attacked as well as the capital structure and the basis for measuring fair value. Government utility projects were created to invade private markets, to depress rates and generally to discredit the industry. Cities were encouraged, through loans and grants, to build competing systems. The method of operation through holding company control was discredited and legislation against it enacted.

From this wave of federal interference with the business, there resulted a depressed market for utility securities, making it well-nigh impossible to sell investors new issues, especially stocks. Some markets were lost, some properties went into municipal hands, rates generally were lowered, taxes increased and regulation expanded.

To many people in the industry this has been such a dreary picture that they have wondered more than once if it was worth while carrying on. Why not abandon the business to the government and let it do the worrying for a while, especially as increased costs, higher taxes and lower rates had caused the return to shrink, in many instances almost to the vanishing point.

The lessons of the past ten years, however, have not been without value to utility people. Let us face the facts.

The ease with which public ownership propaganda, anti-utility legislation and rate attacks gained momentum may be taken as some evidence that the industry's relations with its customers have not always been the best. Subsequent events proved that reliance upon customer ownership of securities as a means of insuring good public relations was not worth the effort.

Some of the financial operations were, to say the least, of doubtful character. Prices paid for properties during the boom years and their subsequent capitalization could not always be justified in the light of after events.

Not all companies were as alert as they should have been in matters of management efficiency. There was too much inclination to feel that state regulation gave utilities certain inherent rights and privileges. There was a tendency to consider rates sacred, not to be dropped except as return became too large. It was believed that through legal processes the industry could stand firm on its rights and privileges. Too much reliance was placed upon state capital or Washington connections to prevent, modify or nullify pending unfavorable legislation.

No Inherent Rights

What has been learned from these facts?

1. Although utilities are in a sense monopolies, operating under government regulation, they have no inherent rights or privileges, but exist solely by the will of the people. If nothing else has been learned other than this one thing, much of the tribulation of this past few years will have been worth while. Government is but the agent of the people. Sometimes we let ourselves think that government acts independently of the people, but, outside of a dictatorship and time of war, this situation is always under the control of the ballot box. So long as the public feels that it can get a more desirable service, everything considered, from privately owned utilities, it will continue to permit the operation of such companies. If the public believes otherwise, the fault is not with the pub-

"Light Talk—Bright Living"
Prize Contest Entry by
J. R. Guidroz, New Orleans Public Service, Inc.

lic, but with the utilities, which either have not performed properly, have been disrespectful of the public, or, as in most cases, have neglected to cultivate the public mind.

2. Largely as the result of rate attacks and increased taxes, management has learned how to operate more efficiently. Operating ratios are lower, new investment is kept under better control. In general the industry is in a healthier position.

3. Rate of return is something to be earned by a utility and not something to be guaranteed through regulation. This means, in other words, that rates are not sacred, but are subject to the will of the people to pay. Therefore, the old theory that rates could be lowered only when a certain reasonable rate of return was exceeded has given way to the theory that return is within the province of management after the public, through its appointed regulatory bodies, has decided what it will pay in the way of rates.

This can be done and is being done through intelligent selling and efficient management. For instance, due largely to expanded residential load, the electric utilities may possibly show better net earnings for the first half of the current year than they did during the first half of 1937, which was generally recognized as a good business year. It is doubtful if very many other industries will be able to make such a showing.

Legal Precedents Unreliable

4. Dependence cannot be placed entirely upon legal precedent. Liberalization of judicial thinking has uprooted some old ideas with respect to utility operations. There is no such thing, for instance, as an exclusive right to serve in certain territory. Knowing this situation, utilities can save time by going to the court of last resort first, namely, the public.

5. Whatever value lobbies may have had, the lawmakers today are swayed by more potent forces—by political expediency.

6. There is a fundamental justice in the people. Given the facts, the public can be relied upon to do the right and just thing. It resents unfair play. The unfairness of some public power advocates in Washington has done more than anything else to turn the tide in favor of private industry. This is reflected in the anti-public ownership vote and in the newspapers.

In other words, there is every reason to believe that the electric utilities as a whole are essentially stronger today than they ever were. It is recognized that there are still some areas where the threat of government competition or interference is causing difficulties, but where this threat has not been present the companies have been able to refinance their debt at the lowest rates in their history.

This does not mean that the attack on the industry is over. In fact, it may be expected to continue in one form or another, and perhaps be intensified in succeeding months. That, however, is not so alarming today as it might have been two years ago, for the public has undoubtedly tired of the continued attacks.

Where is there another industry that has expanded its sales over the 1929 sales as has the electric utility business? Does that not show its ability to meet difficult conditions and, at the same time, continue to make progress? Rate cuts and increased taxes were but the incentive to build volume to restore net.

The industry, contrary to political propaganda, has not been asleep or backward, or trying to harm the government by delaying recovery. The record shows the expansion that has taken place in plant and system in spite of the fact that in 1930, when business was on the toboggan, the utilities added an almost record volume of generating capacity. That has all been put to work and more besides, and still more is on order. Instead of the sharp criticism that the industry's management has received from government, it should be commended for putting its back to the wheel and for its effort to rebuild business to new peaks.

Confidence in the Industry

In surveying the results, one cannot help having confidence in the management of the industry and in its men and in its women. If it can expand under the most difficult and trying conditions of its whole existence, what can it not do when conditions are better and business in general improves? One must have confidence in its ability to sell, for it developed new peaks during depression years. These facts force one to have absolute confidence that the industry can and will get capital when and as needed.

Blank & Stoller

Wendell L. Willkie

The greatest encouragement, however, comes from the confidence that one can have in the character of the public served by this industry. Therein lies the strength of the situation, provided always that the people of this industry do their part to keep the public well served, well pleased, well informed.

The utility industry is the sole master of the situation. It has been on the defensive; it has been fighting a rear guard action. That's wrong. The industry must stand and fight for its right to exist as private enterprise.

The industry has been afraid. That's wrong. If the industry is right, and knows it is right, there is nothing to be afraid of except itself.

The industry has been reticent, voiceless and ingrown. That's wrong. This is the day to talk fairly, frankly, openly, confidently.

The industry has run to the courts the first thing. The experience of the past few years should have convinced us by this time that this at least is wrong. The industry should run to the people.

The industry has waited until the last thing to talk to the people. That's wrong. The industry should go to the people before anything starts and keep at it constantly. In that way only can it keep in good corporate health.

If the people in this industry will do their part to build, be fair, be honest and let the public know, there will be no doubt about the security and opportunity of the future.

"Keep Your Sights on Tomorrow"

The electric utility industry has greater opportunity than any other for service to mankind, for the effective use of capital provided by thrifty saving, and for well-paid jobs and continuous employment

A. C. MARSHALL *and* **H. A. SNOW**, *Detroit Edison Company*
Vice-President and General Manager, and Controller, Respectively

A. C. Marshall H. A. Snow

THE FIGURE recording average annual use of electrical energy by residential customers in Detroit is just changing from three digits to four; that is, by the time these words are printed we may have reached the milestone of 1,000 kw.-hr. per residence customer per year. A decade ago it was 644 kw.-hr. and two decades ago 363, and so in this progressive fashion the use of electricity in the home increases. How far will it go?

There are perhaps 645,000 families in that part of southeastern Michigan in which we are responsible for electric service, and yet there are only some 7,000 families, including those on farms, who are not using electric service. This high customer saturation is in an area of 7,500 square miles, including 39,000 farms. Electricity will soon be available to every family and it will be used by every one. In the matter of saturation of customers there is a definite limit to growth.

Last year the average industrial worker in the factories in Detroit drove a team of seven electric horses to do the heavy work for him so that he might utilize his skill and intelligence to the greatest advantage, and so accomplish more in 40 hours of effort than could his father in 60 hours. Even as late as the end of the Great War, two decades ago, each worker had at his command no more than two electric horses. Will electrical energy ultimately do all the heavy work—including the work of gently exercising unused muscles to keep us healthy?

In one of our new downtown shops a magnificent installation of fluorescent lighting makes it as cool and light as a shaded sylvan glen on a bright spring morning, and yet the requirement of electrical energy is less than half that of the modern tungsten lamp, the waste heat from the lighting being, of course, low in the same degree. The fluorescent tube, with its myriad colors, has outrun the tungsten lamp in efficiency by more than two to one, just as the tungsten lamp outran the carbon filament lamp by three to one. And it was Thomas Edison's carbon filament lamp that created the electric central station industry. What other improvements will come?

Should the President of the United States desire to report to the people of his country a possible crisis in national or international affairs it would require the entire output of a 60,000-kw. turbo-generator to energize the radio receiving sets that would bring to the people of this area every tone and inflection chosen by him to express his meaning. And if war should come again, the very sound of the guns themselves would be heard for the first time in history in every home in our vast country.

Imagination

Perceiving these facts, how can one refrain from dreaming of the years that lie ahead of us—dreams lifted on wings of imagination above the solid foundation of present-day accomplishment, yet having that foundation to support their undeniable probability. Dreams that combine technical advance with the

latent idealism that lies in the hearts of all of us, utility employees, government officials, investors, manufacturers and customers alike. Dreams of an industry that fills with honor a pre-eminently useful place in the world.

The Future

A thousand kilowatt-hours a year is not an adequate supply of electrical energy for even a modest home using the convenient electrical appliances of today. Meters on "all-electric" homes show consumptions as high as 10,000 kw.-hr. a year and these homes are not large, neither do they house large families or many servants. A family of three or four people in a seven-room house may consume to advantage 10,000 kw.-hr. a year. An electric water heater may well require 4,000 kw.-hr., an electric range 1,500, a refrigerator 350, and a radio set 100, softly shaded decorative lighting of an intensity even moderately comparable with daylight, 1,000 kw.-hr. There are a host of less regularly used appliances whose annual consumption depends more upon frequency of use than upon wattage. In process of development is air-conditioning equipment for the control of humidity in winter and of humidity and temperature in summer. Equipment under development is always expensive. When our engineers and industrialists shall have discovered a way to achieve adequate air conditioning at low cost the healthful comfort of air-conditioned homes now enjoyed by only a few people will be widely enjoyed. No, 1,000 kw.-hr. a year is not an adequate supply of electrical energy for even a small home.

Further increases in residential consumption will come from narrowing the gap between what people can afford to pay for appliances and electricity and what they cost to produce. Further reductions in cost can be made, and will be made. Quantity production will help. It does not cost twice as much to make and distribute 2,000 kw.-hr. of electricity as it does to make and distribute 1,000; neither does it cost twice as much to make 2,000 electric ranges as it does to make 1,000. But the greatest progress must come by raising the level of income of the average and lower-than-average American family.

In a country that is blessed with adequate supplies of all needed raw materials, with coal, iron, wheat, oil, cotton and copper; in a country where billions of capital lie idle awaiting profitable use; in a country where there are 11,000,000 potential workers unemployed and where the 30,000,000 employed are in many cases working only short hours, there is no insurmountable obstacle to that full production and active exchange of goods which is the condition of high prosperity. The problem of prosperity will be solved, not by statute, nor by the doctrine of scarcity, nor by limiting working hours, nor by harassing industry, but by the inspired efforts of the men, and women, too, who compose American industry. As we progress toward the solution national income will rise and the electric utilities will have their hands full trying to keep up with the demand for an adequate supply of electric energy.

More Service, Lower Cost

In our shops, stores and offices we need better lighting and we need electricity furnished at so low a price that the close economy which turns on a light when a customer comes and turns it out when he leaves will not be worth the effort. We need much higher intensities of illumination and we need better color for seeing and a greater variety of colors for decorative purposes. It is here that the fluorescent lamp will find its first startling, effective uses. And here again progress will come, in part from cheaper electricity, but more from busier shops with a volume of trade which will permit full, generous operation untrammeled by the need for pinching economy.

It is in shops and stores and offices that air conditioning has gained its first foothold. Customers who are hot and uncomfortable on a blistering summer day seek eagerly those shops which are comfortably cool for their buying, those restaurants which are comfortably cool for their eating and those theaters that are comfortably cool for their amusement. Shopkeepers who have not taken up air conditioning must content themselves with the trade that comes from those customers who cannot crowd into the air-conditioned shops of their rivals. Just as good lighting raises output more than enough to pay for its cost, so does air conditioning. A drafting office in Detroit, recently air conditioned, increased its summer output from 1.38 drafting units per man-hour to 1.76 units. The air conditioning that made possible this efficiency was not expensive—it was economical.

The electric motor has revolutionized factory production. Power-driven machinery, guided and supervised by intelligent labor, can turn out many more units of output than can the most muscular and energetic man with a hammer, and modern machinery is always driven by electric motors. The presently effective limit on the industrial use of electric energy is the market for the factory output of goods. That is, the use of electric energy in industrial processes is not limited by lack of inventiveness or applicability or by competition with other sources of power, but by the same general difficulty which limits the consumption of electric energy in our shops and homes; the problem of harmonizing and inspiring men, money and materials into high activity. When this problem shall have been solved the factory demand for kilowatt-hours will be insatiable. It is the state of activity of industry which determines the use of electric energy in industrial processes; in April, 1933, the Detroit Edison Company sold 60,000,000 kw.-hr. to Detroit factories, but in April, 1937, it sold

"Power—Controlled"
Prize Contest Entry by
C. J. Maxwell, Oklahoma Gas & Electric Co.

135,000,000 to pretty much the same factories because they were reasonably busy in 1937 and they were half-paralyzed in 1933. The electric utilities will be ready to supply the enormous quantity of electricity which will be sold when the problem of widespread national activity and prosperity shall have been solved.

Rapid Progress

The younger employees in our service remember the time when the radio receiving set of today was quite unknown; the older employees remember the kerosene lamp. The boyhood homes of many of us had no electric lights. There wasn't a kilowatt-hour to be had in the entire village, nor would we have known what to do with it if we had had it.

The original carbon filament incandescent lamp that marked the beginning of the central station electric utility industry is less than 60 years old; the dependable alternating-current motor is less than 40 years old; the tungsten lamp was introduced less than 30 years ago, then so delicate a contrivance that it must not be jarred or burned in a horizontal position lest it fail; the electric range and the electric refrigerator in commercial quantities date from 1920 or thereabouts; it was in 1921 that the country was seized with the mad demand for the ear-phones and catswhiskers and crystals that brought the first radio reception to our homes. The fluorescent lamp is only a year old. We have seen a television set on exhibition and have delightedly compared the performer before the microphone illuminated by a battery of high-powered lamps with his moving, speaking image on the television screen at our side. New applications of old principles and mechanisms and improvements in mechanisms already in use crowd around us in an imposing, accelerating record of new development. How can we think of the future as devoid of progress? He who foresees only lethargy and a consolidation of gains already made must be dull indeed. His vision extends no further than the object which he holds in his blunted fingertips; he has no flights of fancy to lift him from the ground on which he stands.

Suppose in this nation—the best educated, the wealthiest, the most inventive, the most resourceful nation in the world, past or present—that the economic kinks should be straightened out. Suppose that lethargy should be replaced by activity, caution by courage, and hatefulness, greed and mutual distrust by co-operation. Suppose that Hitler and Mussolini should pattern their ambitions after those of Confucius and Jesus of Nazareth, instead of after the mad dreams of Napoleon Bonaparte, so that the assurance of peace might descend upon us, leaving us free for the farm, mine and factory. Suppose that John L. Lewis should chance upon and read and appreciate a copy of Abou Ben Adhem and while under its spell make friends with William Green and with the operators of our coal mines. Suppose that the Federal Power Commission and the Interstate Commerce Commission and the forty-odd state utilities commissions should recognize the evils that may be worked upon utilities by so denuding them of revenue and so mummifying them in wrappings of red tape that they cannot meet effectively the changing conditions of competition nor attract capital needed to finance change and growth. Suppose that the electric utilities, all of them, laying aside avid dreams of wealth and empire, should devote themselves to giving the best possible service at the lowest possible cost consistent with good wages to employees and fair dividends to stockholders. Suppose that our legislators should set themselves to the harder task of repealing and simplifying old laws instead of passing new ones. Suppose that our political executives should quit bidding for re-election by pandering to envious ignorance and greed and should recognize that industrial competency must be rewarded lest ambition die and effort cease. And suppose that our business men should accept the idealism that sometimes inspires political leadership and supply helpfully from their own experience the practicability needed to make any high ideal workable.

Even in Small Degree

If these things should come to pass, even in some least degree, then progress would come, and men and materials and money would spring into activity. Young college graduates, ambitious and competent, would not find it harder to get a job than to get an education, would not so frequently drift back to non-productive stagnation in the halls of learning.

In this renaissance no industry will bear a more vital and important part than that of the electric utilities, which must supply the energy to light and heat and activate the new world. Plans are ready, engineering is an accomplished fact—not an experiment. Capital can still be borrowed and foresighted leadership is eager for high accomplishment. No other industry will have a greater opportunity for service to mankind, for the effective use of the capital provided by thrifty saving, for well-paid jobs and continuous employment, for research and for the application of the fruits of research to make possible higher standards of living.

To discharge the responsibility that will come to it the electric industry will need youth—youth in young men with their tireless energy and their courage to venture where angels fear to tread; youth in older men, tempered and guided by the wisdom that has come to them through the experience of the years. The industry will need imagination and resourcefulness to adapt itself to changing requirements and to take full advantage of new equipment and new methods. Freed from the shackles of distrust and hatred, endowed with youth and imagination and faced with the mounting necessity for rapid growth and increasing service, here is an industry glowing with opportunity!

"Kenwood Conduit"—Prize Contest Entry by Helmer Sorenson, Wisconsin Electric Power Co.

Today's Problems That Make Engineering Opportunities

Technologically an infant, the electric power industry offers wide possibilities for the employment of trained men who are willing to apply themselves and take responsibility

PHILIP SPORN, *Vice-President and Chief Engineer, American Gas & Electric Service Corporation*

OURS is the machine age, but while the machine is the dominant influence in our present mode of life, and while the machines do the work, the force behind the machines is power.

There are, of course, many forms of power, but the electrical form with its ease of transportation and distribution, conversion and control, has become to a large extent synonymous with the general term power. Thus the progress of our present civilization, the advance that is being made in lifting the age-old burdens of heavy toil from the backs of men and in raising their conditions above the bare subsistence level and so releasing human energies for mutual contacts between human beings—in short, in permitting men to develop and enjoy their cultural life and the life of the spirit—that progress, for the mass of mankind, can be traced almost by the curve showing the growth in availability of power for each worker or for each unit of the population. That is to say, it can be traced by the curve of kilowatts or horsepower available to each man plotted against time. That this curve has not reached an asymptotic condition is obvious and scarcely needs proof.

Future Is Assured

There exists thus every reason to believe that the future of power, and of electric power in particular, in our present civilization at any rate, is assured in so far as the future of any element entering into the compound of human destiny can be said to be assured. As a matter of fact, those who have studied thoroughly or have thought deeply on the question, have concluded that if more of the products of the earth and factory are to be assured to the average individual, more will have to be produced for the same amount of human labor now expended. That inevitably means more power consumption. Thus the more abundant life, in its finest sense, and greater energy consumption are closely intertwined.

Granting the bright future facing the production and distribution of electric energy, what does this signify to engineers and technicians now engaged in practicing the art? Or, and this is of equal and possibly greater import, what does this promise to those on the threshold of choice between this and some other art or profession as a field for the development and exploitation of their talents and abilities? Is further progress possible or have all such avenues been explored and pre-empted?

Technological Infancy

These questions are not new. But there never before has been a time when they were more pertinent or so pressing for an answer, particularly when considered in the light of a general feeling that we have arrived at a marked and critical period in our social and economic development. Their answer has, besides, become increasingly important in view of repeated declarations by people of some responsibility in the electric light and power industry, that in the technical field—in the engineer's field, in other words—a point of stabilization had been reached. If this were true it would mark not only a grave condition to be pondered by every young and even by the mature engineer, but the beginning of a most dangerous if not catastrophic era for the entire industry as well.

Fortunately the entire notion of stabilization is fallacious from top to bottom. For one thing, in an industry where the ratio of invested capital to annual gross receipts is as high as in the utility industry, being of the order of 6.5:1, and where, to put it differently, the investments in tools of production for each individual employed are as high, roughly $52,000, it is inconceivable that the future application of human thought, inventiveness, and effort, cannot do something of significance to bring about a reduction in these values as power systems grow. Besides, while the basic element of the industry—service—and its quality are satisfactory for today, experience has shown that it would be rash to assume that it is so for tomorrow. Again, the pressure from all sides to reduce rates to the point, frequently, below a sound subsistence level, can be met only if ways and means are found to reduce costs. And in the same category can be placed the sometime socially desirable, but, economically, frequently most difficult, making of extensions of service into

Philip Sporn

"Prime Movers"—Prize Contest Entry by H. B. Darden, Monongahela-West Penn Public Service Company

areas that cannot support the costs of such service.

The saving feature in considering all of these aspects is the fact that we are still in our technological infancy and, as long as we are, as long as we are not stabilized, routinized and fossilized, something can be done about all of these disturbing conditions. The doing of that something is dependent, however, on the availability of men of the proper character, temperament, possessing the necessary training and alive not only to their opportunities but to their responsibilities as well.

Problems

In order to appreciate properly the opportunities open to engineers in the electric utility field it is desirable to review the present status of the art of power supply.

First, consider generation. It is commonly thought that we have of late made rapid progress in advancing the technology of steam power generation. And we have. But critically examined the 10,000 B.t.u. performance expected of the 2,400-lb., 950-deg. installation now under construction offers no cause for complacency, if it be compared with the Nordberg engine 19,200 B.t.u. performance, circa 1900, instead of with the Newcomen engine performance of about 420,000 B.t.u., circa 1770. A problem and opportunity here? Yes, most certainly. How solve it? By going to higher temperatures for one thing; by more reliable and less costly binary cycles as another possibility, and by totally different prime movers as a third possibility. But this is not intended to serve as a detailed outline for a research and developmental program.

When we consider the electric generator we find that a mere beginning in application of scientific principles to the important element of heating and cooling has been made. Hydrogen cooling, for example, has been successfully developed and applied to high speed large size alternators, condensers and motors. But the use of higher gas pressures than atmosphere has barely been started. Nor has the idea of the use of liquid media for core and embedded winding cooling been much more than toyed with. Again, the questions of application of refrigeration and of higher temperature resisting insulating materials have received mere preliminary prospecting, so to speak, and the real mining work remains to be done.

In the boiler room, keeping in mind that coal is now and will be even more so twenty-five years hence the basic energy source, it is somewhat disconcerting, to say the least, to find that we know so little about its physical and physical-chemical properties. The nature, composition and behavior of ash—their effect on the rate of heat transfer, to cite one important problem—is an almost dark secret. Yet truly scientific boiler design demands a most exact knowledge of the answer to these and to similar questions, unless we are to be confronted with a continuance of the present reign of guess and empiricism.

Higher temperatures mentioned in the case of turbines as a means of increasing thermal efficiency presuppose an ability to deliver steam at those higher temperatures. But we have already reached an impassé in this direction. Not only are satisfactory and economical steels unavailable for temperatures in excess of 1,000 deg. F, but research is hindered by a lack of knowledge of the phenomena occurring at steam temperatures well below this value. Help is thus needed on the physical, chemical and metallurgical fronts. Perhaps the necessary help will not be forthcoming soon enough and the developments that will take place will be along the lines of different types of prime movers, perhaps even boilerless prime movers. But in either event what a vista of opportunities this opens up for the application of engineering thought and effort!

The picture is no different in the transmission field. Here the problem still is, as it was twenty-five years ago, to make a process that was economically burdensome and technically difficult owing to the additional hazards to service it introduced, workable under new conditions when much larger blocks of power have to be handled and when distances may further increase as plants are forced to go further beyond load or consumption centers.

Future of Transmission

Numerous solutions by the use of direct current have been suggested and some even tried, but a truly successful answer still has to be worked out. Perhaps no satisfactory answer will ever be found until a more satisfactory electronic tube, capable of handling higher currents and voltages and of greater and more consistent life, is developed. This, however, merely emphasizes the additional avenues for progress that are open.

In any existing transmission scheme a vital role has always been played by and, for a long time, will undoubtedly be played by, the power transformer. Yet consider the small advances of a basic nature that have been made in transformer practice in the last twenty-five years. Excepting the better understanding of and designs to meet the impulse strength requirements, no advances of any consequence have taken place in the more efficient use of materials, whether iron, copper, oil, or the cooling media. A step forward is overdue. As a matter of fact the beginning of such a step has just about been made with a bold new forced circulation design in process of installation, but much more remains to be done.

If, while exploring the possibilities of totally new methods of transmission, we confine ourselves to the only practical system available today we again find a fertile field for cultivation of improvements and refinements. Ultra-rapid reclosure of faulted lines and economical ways of accomplishing this has only been

thoroughly enough tried to prove its feasibility and its economic possibilities. It now needs a period of full development. Still confining our attention to the overhead system, there are the problems of sleet melting and sleet detection; advances in each can materially improve transmission reliability.

Endless Problems

In the underground field there are literally a host of pressing problems, ranging from the fundamental ones of thoroughly exploring the physical, chemical and electrical properties of insulating materials, oils and lead in present types of cables, to the development, again, of totally new and different methods of underground transmission.

It is commonly recognized that distribution offers the toughest individual problem in the whole power supply field. In many classes of service—rural service for example—distribution cost is the dominant element in determining cost of service and, as a corollary, in determining the extent to which private enterprise can go in extending service into areas of decreasing load density. A great deal of progress in lowering costs has been made over the last ten years, but this has all resulted from an integration of many small savings. Fundamental and basic changes in materials, design and installation methods are needed not only in the rural field but in the entire distribution field if the past history of the industry of more and better service at less cost is to be continued without a break. Thus it is seen that here in the end process, so to speak, of electric power supply and service, as in the initial or generation process, many wide avenues of opportunity for engineering thought and work are open and must be explored if progress is to continue.

Management Problems

Today as never before, in the management field of the electric utility industry, problems of a most complex nature are arising, the proper solution of which is greatly facilitated and is only possible in some cases, by resort to engineering principles, ideas, methods and personnel. These problems are present along every sector of the management front: Investor, public served, regulatory body, and employee.

With the investment ratio of over $6.50 per dollar of gross revenue already referred to, and the consequent slow turnover of capital, assurance of safety of investment under all foreseeable conditions requires the most thorough technical backing for any project in addition to the usual sound management judgment. It is evident also that the danger of obsolescence, present in any industry, needs to be particularly guarded against in one involving as high a ratio of capital investment to gross, and particularly so in the light of all the technological developments continually under way or on the horizon of possibility. That this can be done has been adequately proven in many cases, but this serves only to emphasize the effective engineering spade work carried out in the past and the need for continuing along the same lines in the future.

Public Does Not Know

Perhaps no other industry, certainly no other public utility industry touches the lives of the entire population so completely as does the electric power industry. The industry has with but few exceptions, discharged its obligations to the public it serves in a most responsible fashion. But it is questionable whether the public as a whole is aware of that fact or appreciates the contribution that the utilities of the country have made to advancing national welfare and prosperity. Here the engineer, with his thorough knowledge of the complete machinery and mechanism of utility service, ought to be able to act as a fair interpreter between the utility and the public it serves. Let him not make the mistake of taking for granted the lightness of his task.

Whether the trend toward continually increasing supervision by regulatory bodies, both federal and state, which has existed for many years but which has shown itself markedly during the past six years, continues is difficult to predict. But it seems reasonably certain that the amount and extent of present regulatory activities are not likely to diminish for some time to come. Offhand it would appear that these activities involve primarily and exclusively the legal and accounting staffs. Actually it needs to be remembered that many of the newly created regulatory agencies and staffs of older agencies engaged in new activities are frequently without the complete knowledge of the complex mechanism of a public utility they and the utility regulated would desire. But they invariably are eager to learn. Here again, therefore, is an opportunity for the engineer. It stands to reason that the engineer is in an unusually advantageous position not only to "tell the story" of his company but at the same time to spread on the record and thus help disseminate the principles and ideas behind the planning, the constructing and the operation of the extensive and expensive physical plant entering into utility service.

It has already been pointed out that in the utility industry the tools of production behind every individual employed represent an investment of some $52,000. This is

"Modern Knights Use Rubber Shields"—Prize Contest by Albert S. Anderson, New Orleans Public Service, Inc.

higher than in any other industry. It compares, for example, with a figure of approximately $11,500 for the steel industry and with a figure for industry in general of some $7,600.

This fact of large investment per employee, of necessity, introduces a multi-headed management-employee problem. There is first the problem of responsibility of stewardship and proper performance of duty. With such a ratio of plant per average employee it is not surprising that in some cases as much as $2,000,000 of property is under the control and operation of a single individual. Again with such a state of affairs there is always the possibility of ill-guided attempts by labor to introduce pseudo-corrective devices while failing to recognize that such steps can do nothing but reduce individual productivity and thus undermine the economic foundation of the industry of which it is a part. By the same token, it is always possible, unless the danger is watched, to permit the injection into labor's bloodstream of thought the dangerous virus that in an industry that is a natural monopoly, costs at which service is rendered and, therefore, expenses which are incurred in the rendering of that service, are of no significance. If such a thought were permitted to become implemented it would nullify those elements of strength which now serve as the sound bed-rock foundation for the entire utility structure. It would obviously make more difficult, if not impossible, the further expansion of electric service which is so dependent upon ability to reduce costs.

The engineer because of his intimate knowledge of all the elements of an electric utility system, and because of his appreciation from such direct knowledge of the factors that are so vital to a continuation of future sound development and extension of the system, has an unusual opportunity, if he is properly equipped, to act as an intermediary between the public served, the system and facilities necessary to render service, and the main body of employees. Without their work behind the machines and behind the facilities no service of any kind is possible; without their complete understanding and co-operation no first-rate and economical service is imaginable.

Opportunities for Engineers

It is evident from even the brief discussion given above that in almost every branch of electric utility endeavor, work of a fundamental, complex, but always constructive nature remains to be done. Moreover, as the industry has grown and as it grows further in the future, these problems have increased and will increase in scope and complexity. Their solution, whether they be problems of a strictly technical nature, like the advancing and bringing forward of higher steam pressures and steam temperatures, or new thermal cycles, or the introduction of newer and more efficient methods of designing and operating dynamo electric machines, or in the field of transmission, distribution and utilization, or whether even in the more complex management field involving relationships between capital, government and labor, will call more and more for an exact knowledge of the component parts of the complex organism that enters into rendering modern and efficient electric utility service. Who is to tackle these jobs? Who will be able to take advantage of the opportunities that are open today and that will be open as long as the industry grows, and maintains the important place it holds today in our social economic structure?

Enlarged Engineering

It would seem as if engineers have here an opportunity to serve and to develop their talents and abilities at least the equal of that existing in any other field of economic endeavor. But the engineers who will be found capable of serving and capable of taking advantage of the opportunities as they are opening up will not be those who, having submitted themselves to a course of training, no matter how rigorous, end their search, secure in their belief and their conviction that as especially equipped members of society they are entitled to a special and above average share in the compensation society offers, for the balance of their lives. Nor will they be those who do not believe in the expansive capabilities of the human mind and human spirit and in the advances that are possible through the persistent and continuous application of human effort. Again, they will not be those who, having painfully acquired a thorough knowledge of fundamental principles, whether they be in economics, in thermodynamics or ethics, fail to check their own efforts at contributions to thinking and to progress by the adherence of their efforts to those principles.

But to those who are willing to apply scientific and engineering principles and methods and apply the necessary effort to the solution of the multitude of problems outlined above in detail in some cases, and merely suggested in others, and to those who are willing to equip themselves with the necessary training and understanding to have at least some idea of whither they are going and what part they can play in the march forward of our entire civilization of which the electric industry is so characteristic a part,—to those—the opportunities to serve and advance are wide open.

Steam Power"—Prize Contest Entry by
. W. Dillard, New England Power Service Company

Romance

OF THE ELECTRIC UTILITY INDUSTRY

AS PICTURED BY THE PEOPLE EMPLOYED IN IT

ELECTRICAL WORLD

JUNE 3, 1939

IN INDUSTRY there is a quality which makes men proud to labor therein and be a part of it. Beyond the inanimate physical structures, equipment and material a penetrating vision will catch the thrill of service to mankind. This is romance.

In no other industry has this element of romance been so pervading or so penetrating as in the electrical industry. For half a century it captured the imaginations of men, bringing thousands of them eagerly to its ranks. During the past decade, however, the eyes of vision have been dimmed by what appeared to be the more pressing problems of the moment.

Yet through these years the romance of the industry has been ever present, only its power to stimulate and inspire was diminished. For an industry or its people to see visions of opportunity this vital spark must glow brightly.

And so Electrical World asked the employees of electric utility companies to "picture romance." Twelve prizes were offered for the best photographs and romantic titles.

Most prize picture contests are considerations singly and simply of the photographic and artistic merits of the entries. This contest had a larger scope. Its purpose was to bring together and to determine the best among the efforts of a definite group of people to see and to make visible to others the quality, the spirit, of the industry that employs them.

Therefore, it may appear in certain instances that the pictures selected as winners fall a little short of the *ne plus ultra* of photographic excellence. The judges were conscious of this, but their job was to search for and to find among the

hundreds of entries pictures that best expressed a feeling of and for the electric utility, its place and its participation in our modern life. In their search the judges were forced to pass over many fine examples of photographic quality because that was all they were. Also, many entries were rejected because, while they had the feeling of romance, their photographic composition or execution was lacking in some essential quality. Almost every entry, however, caught the spirit of the competition and the sum total was visible evidence that romance is not dead, but is a living, vital thing with the people of this industry.

The prize-winning photographs appear on the succeeding pages. Only a few of the many aspects of this great industry appear in these twelve pictures. To show all of them would be an impossible task.

In each of the pictures there is some flavor of that intangible quality called romance — the romance of service and of achievement.

Electrical World believes that whoever looks at these pictures with an understanding eye will see in them a reflection of what the electric utilities mean to our country, will see an industry that has grown and flourished mightily in the American way of free enterprise and will continue to grow as long as that way is open to them.

It should be apparent from looking at these pictures that the imagination, inventiveness and enterprise which built the electric utility industry to its present great estate still stimulate a vision of opportunity in the future expansion of the industry to greater usefulness.

F I R S T P R I Z E

PUBLIC RELATIONS

By DOUGLAS WHITE

After that big, friendly lineman has told them what might happen if one of their kites got entangled in the high voltage transmission line, it's a pretty safe bet that these boys are going to be careful where they fly their kites. This kind of understanding is the foundation stone of good public relations.

Mr. White is employed in the advertising department of the Southern California Edison Company, Los Angeles.

SAM
HI-FI

SECOND PRIZE

THE NIGHT WATCH

By CHARLES M. GOLUEKE

As night closes down, most of the work-a-day world prepares for rest, but not the electric power system. It just goes right on running, through the night to the new day tomorrow. The subject of the picture is the Bayside plant (Green Bay, Wisconsin) of the Wisconsin Public Service Corporation, of which Mr. Golueke is an employee.

PRIZE AWARD

SERVICE TO THE OUTPOSTS

By DONALD G. SNIDER

Not only to the city dweller, but as well to those who live in lonely distance from street and traveled road does electricity bring its service of light and labor saving. This picture shows a scene on the Chef-Rigolets rural line of New Orleans Public Service, Incorporated, employer of Mr. Snider.

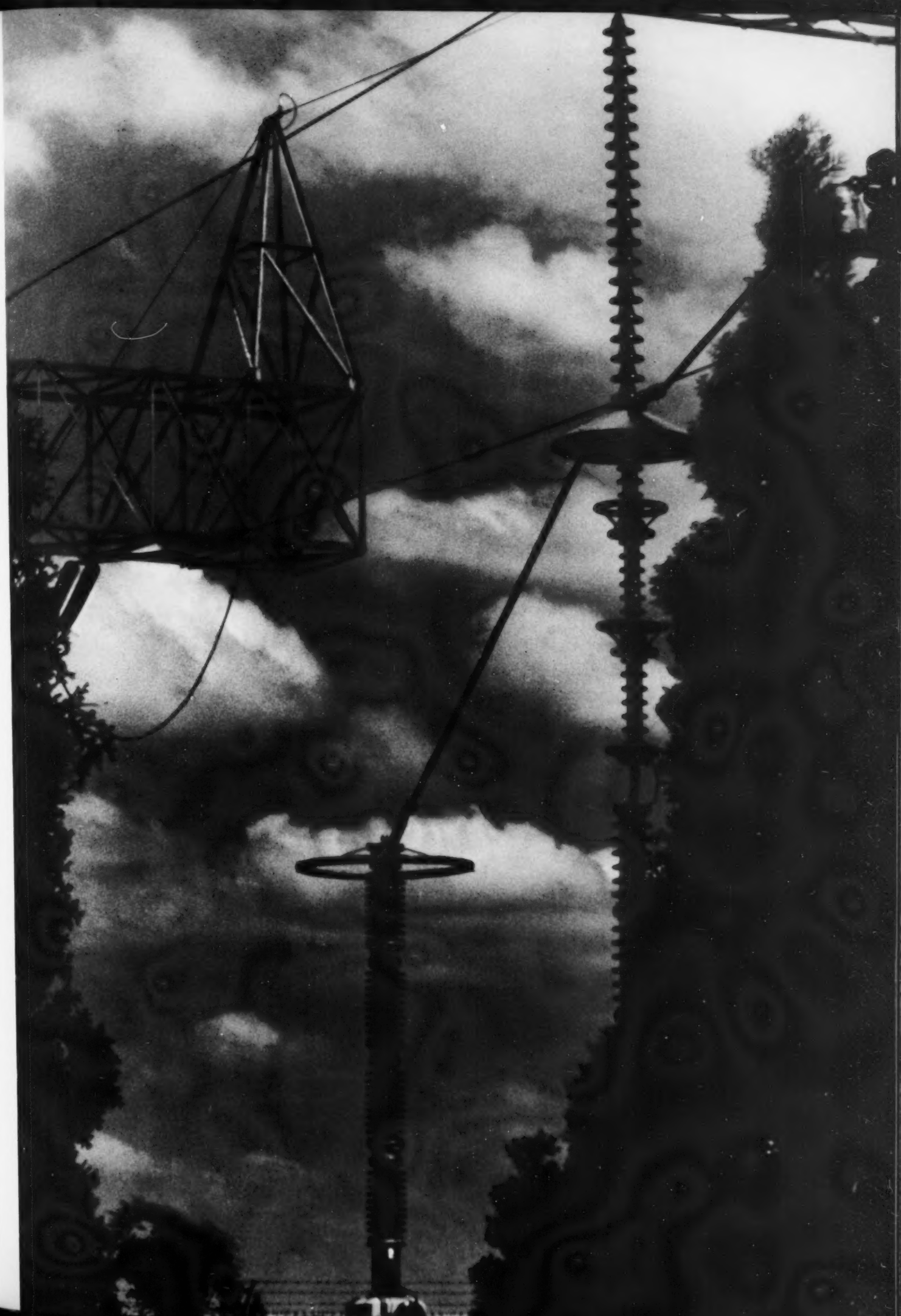
PRIZE AWARD

GUARDIANS OF SERVICE

By W. H. BLAIR

A lightning arrester is certainly a guardian of service and so, also, is a coupling condenser for carrier current relay system. Both appear in this picture, the one in lower center and the other to the right. The installation is at the Washington end of the Safe Harbor-Baltimore and Washington 230-kv. tie line.

Mr. Blair is a tester in the meter laboratory of the Potomac Electric Power Company.



P R I Z E A W A R D

DAWN'S EARLY WORK

By ROBERT I. POWERS

From the fact that Mr. Powers, employed by the Wisconsin Electric Power Company, titled this picture "Night Watch," to which it was considered that the second prize winner had first claim, one may assume that this man is on what station operators call the "graveyard trick" through the early morning hours. The day load is beginning to come on and the rotary converters are being started.

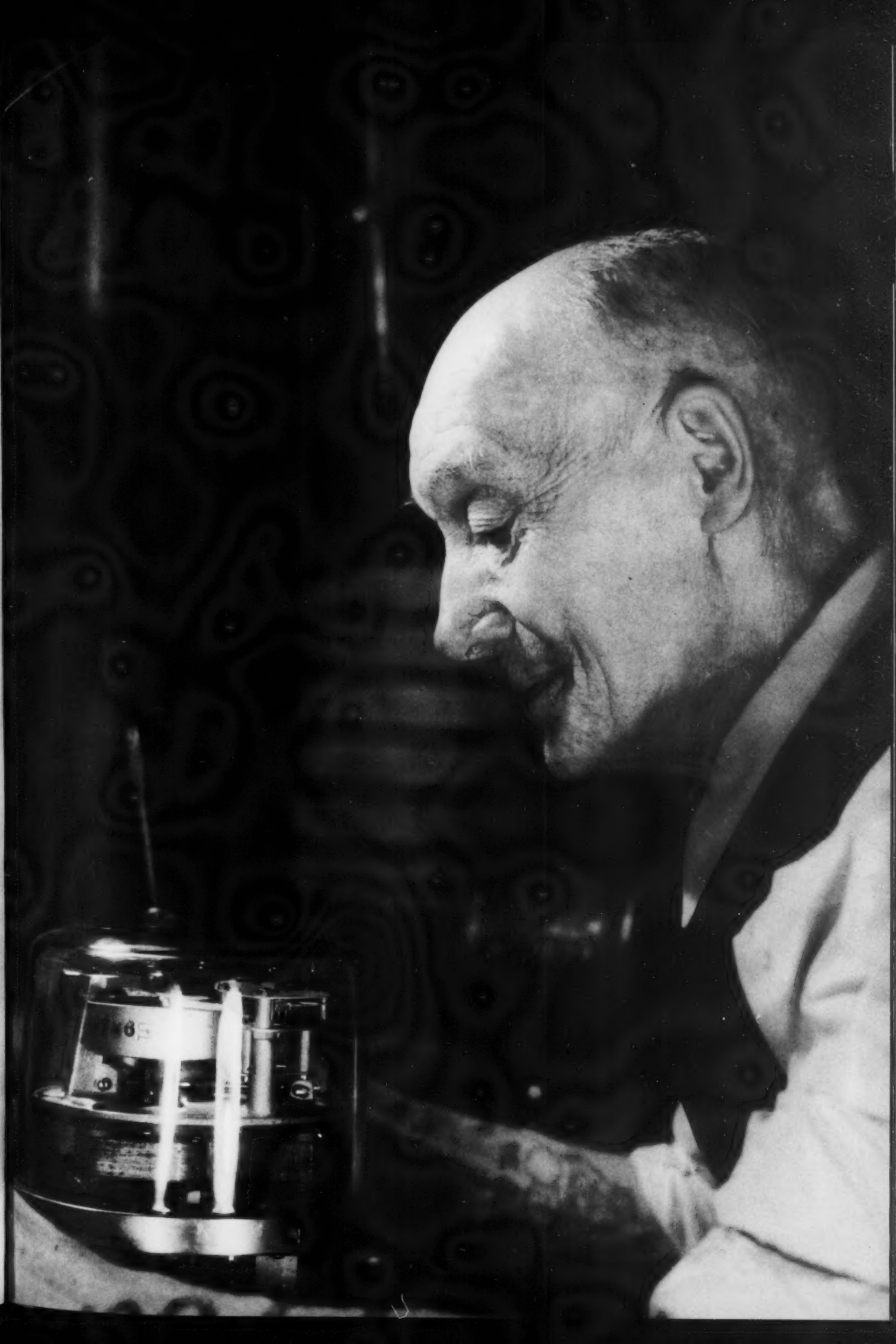
P R I Z E A W A R D

TOTAL SERVICE RENDERED

By HAROLD V. PIERCE

The accumulated reading on the dial of the watt-hour meter states the total service rendered through it. And after skillful attention from the experienced hands that hold it, the meter will go out to measure again.

Mr. Pierce is employed in the audit department of the Washington Water Power Company, Spokane.



P R I Z E A W A R D

IN THE EARTH AND IN THE SKY

By EDWARD T. PEARSON

Framed in the rim of the manhole through which pass the cables of underground lines appear the downward smiling faces of men working on electrolysis survey, while above their heads rises a transformer pole in the overhead distribution system.

Mr. Pearson works in the testing laboratory of the Public Service Electric & Gas Company at Irvington, New Jersey.

P R I Z E A W A R D

PERSEVERANCE

By H. E. CLEMENTS

Night "hot stick" work on a 66-kv. line. Because the line is on a private right-of-way in a very difficultly accessible location it was necessary to complete the job once it was started. And this meant working all day and all night.

Mr. Clements is distribution engineer of the Empire District Electric Company, Joplin, Missouri.

P R I Z E A W A R D

PLANTING PROGRESS

By ARTHUR W. MILLER

Not the poles that are planted in holes in the earth, they do not grow. But the progress that comes from their planting, that grows. In this way of looking at it, the pole hole digger is one of the most effective garden tools ever devised.

Mr. Miller is the photographer of the Consumers Power Company, Jackson, Michigan.

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P R I Z E A W A R D

GRAND CANYON OF STEAM

By DOUGLAS WHITE

The soaring fronts of oil-fired boilers in the Long Beach plant of the Southern California Edison Company, with the sunlight streaming down from glass monitors high above, inevitably suggested the title of this picture.

Mr. White is also the winner of first prize in the contest.

P R I Z E A W A R D

KILOWATTS IN THE ROUGH

By JAMES L. DAVIDSON, Jr.

Coal barge and coal handling equipment at Waterside No. 2 generating station of Consolidated Edison Company of New York, Incorporated, in which company Mr. Davidson is a junior engineer. In the background is the Queensboro bridge across the East River.

NO 112

P R I Z E A W A R D

THE WORKER AND THE TASK

By GILBERT H. BAUGUESS
RICHARD S. SHUMAN
CHARLES E. TOCE

This photo-montage, the joint work of a substation operator, an attorney and a meterman, all of the Boston Edison Company, Boston, Massachusetts, is as much an example of productive cooperation in its making as in the story it tells. That's how our homes are lighted — by the harmonious working together of giant machines and of thousands of other electric system elements, not forgetting the men who operate and tend them.

To THE ELECTRIC UTILITY employees whose participation in this contest made it so successful, to the utility executives whose encouragement stimulated such a large number of entries and to those utility house organ editors whose support was so helpful, Electrical World expresses its grateful appreciation.

Thanks also are due the judges, HARRY HALL FRAYZUR, LIFE MAGAZINE; HOWARD WEEKS, CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., and KEITH HENNEY, PHOTO-TECHNIQUE, who so well expressed their understanding of the purpose and spirit of the competition in their selection of the winners.

The St. Lawrence Battleground

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

THE STRANGEST thing about Washington is that the people whose market baskets, clothing budgets, amusements and rents are vitally affected are never vocal when measures calculated to affect their necessities and luxuries are being decided by the government, which is supposed to be their servant.

Special interests, corporations directly affected, scream their heads off; but Honest John Taxpayer, who has more interest than any of them, so far as his pocketbook is concerned, rarely remembers on election day whether his congressman voted for pork or for economy.

Fight on Three Fronts

Three important developments in Washington in the last ten days have been almost ignored, save in some up-state New York cities, yet they are vital to every taxpayer, every railroad security holder, every electric utility stockholder in the entire country.

One was the hearing before the Federal Power Commission on the old application of the Niagara Falls Power Co. to use an additional 275 second-feet. Important because the government is attempting in this case to attack the power companies all over the country, and is doing it on utterly incorrect figures, as frankly admitted in the course of the hearing!

Another was the hearing before the Interstate Commerce Commission, in which the carriers on the old Erie Canal are protesting at the cut by the railroads in grain rates from Buffalo to New York from 6.7 cents a bushel to 5 cents flat.

And, third, is the apparently inspired suggestion that when the King of Great Britain talks with the President Mr. Roosevelt will urge his Majesty to use his influence with the Canadian government to push the St. Lawrence Seaway. Important because Canadian Premier McKenzie King will be with the royal party!

Years ago John Taxpayer had a representative in Washington. Senator Theodore E. Burton of Ohio used to talk pork barrel bills to death. His favorite criticism of any river development project was to say: "Why, Mr. President, the government could afford to buy every pound of freight that will ever be offered for shipment on this river, and burn it, rather than spend this money for making this river navigable. The government would save money by so doing."

It's the St. Lawrence Seaway in the background, of course, but this water navigation myth is almost as clinging, and as delusive, as that other one about hydro power being almost dirt cheap as compared to steam power.

The main idea of the St. Lawrence Seaway, of course, is to provide cheaper rates for western grain for export. But listen to these subsidized carriers on the New York Barge Canal—the old Erie Canal—scream at the idea of the railroads taking their business!

The funny part of the whole business is that the railroads didn't make that cut in grain rates this summer in order to take business from the Barge Canal. They did it to get some of the business back which the Canadians have been taking from them, and taking, mark you, without the aid of a St. Lawrence Seaway, for which Uncle Sam would foot half the bill.

Last year, it was testified, 77,000,000 bushels of American wheat was shipped abroad through Canadian ports, as against only 30,000,000 bushels shipped via U. S. ports. The percentage of wheat which moved through U. S. ports to export in 1932 was 76. In 1938 this had shrunk to 28 per cent. *Without* the seaway!

Meanwhile the Federal Power Commission has been having a field day with the power companies over this comparatively trifling application for 275 more second-feet. The application has been pending for twelve years. Hearings have been held on it from time to time, but there has never been a decision. The government has used the 275 second-feet wanted by the Niagara Falls Power Company to advertise its theory that four family groups, the Morgans, Mellons, Schoellkopfs and Carlisles, constitute a huge octopus whose tentacles stretch out to control all the important hydro-electric companies through banks, industries, holding companies, investment trusts, etc. The government has charged that under this set-up the Niagara Falls Power Company has not only failed to make efficient use of the water licensed to it under the Federal Water Power Act, but that it has discriminated against its domestic customers in behalf of favored industries, violated the terms of its license and acted in restraint of trade in violation of the anti-trust laws.

Incorrect Figures

In the course of the testimony Gerald V. Cruise, acting chief engineer for the New York Power Authority, which is interested in setting up a huge public ownership project and is promising the customers TVA rates, admitted that the estimate of $287,000,000 was based on the Warren report made in 1918. Mr. Cruise said that construction costs have not materially increased since then, adding that 1918 was the peak of wartime prices.

Cruise continued that his cost figures had been taken from figures contained in *Engineering News-Record*. However, Attorney Clarence R. Runals, for the company, produced copies of *Engineering News-Record* to prove that construction costs have advanced 23 per cent since 1918.

Chief counsel against the company—it is sort of difficult to write "for the government"—is William S. Youngman, who is said to have refused a $30,000 job with an oil company recently, and who is now Secretary of the Interior Harold L. Ickes' adviser on municipal power problems. He technically represents the New York Power Board, and is seeking to have the Niagara company's license revoked.

Editorials

S. B. WILLIAMS, *Editor*

Will Ickes Take No for an Answer?

WHAT is the honorable Secretary of the Interior going to do with the city of San Francisco, which defied him at the polls on May 19 and again said NO to municipal ownership? Maybe Mr. Ickes "no spik Engleesh." Eight different times during the past twelve years municipal ownership has failed to get the approval of San Francisco voters, and the last defeat brought out the largest number of voters yet.

The first election in 1927 was slightly in favor of a bond issue for a publicly owned transmission line. It failed because a two-thirds vote was necessary. In 1928 an amendment to the charter for a 50-million bond issue for constructing and acquiring an electric utility system was first proposed. That year it failed by 4 to 1, in 1932 by 1⅓ to 1, in 1935 by 1½ to 1, in 1937 by 1⅕ to 1, and this year by 2½ to 1. There were 171,000 votes cast this year, against 143,000 in 1937 and 123,000 in 1935.

The city of San Francisco receives water and power from the Hetch Hetchy project, which is located in a national forest. The Raker Act, which covers this contract, provides that the power shall not be sold to a private utility. Instead of building or acquiring its own electrical system, the city has arranged with Pacific Gas & Electric to be its distributing agent. Secretary Ickes, under whose jurisdiction Hetch Hetchy comes, has contended that this is a violation of the act. After several elections, all costly to San Francisco, the case was taken to court and the act held infringed. The case is now on appeal.

There is more to this case than its mere legal merits. The people of San Francisco have said repeatedly that they do not want municipal ownership. Can it be forced upon them by an anti-private utility federal administration? If the contention of Washington that a city should own its own electrical system if it so desired is reasonable and proper, isn't it equally valid that a city not wanting municipal ownership need not have it?

And suppose Mr. Ickes wins in court and the people of San Francisco still do not want public ownership, then what? Will he attempt to deprive them of power and water, or will he finally take "no" for an answer and have the Raker Act amended?

Any way it turns out it is going to be a difficult test of the flexibility of New Deal logic.

Security of Employment

A YOUNG electrical engineer recently came into our office to find out how he could get a job with some utility. He didn't care whether it was electric or telephone, just so long as it was a utility. And the reason he gave was stability of employment. He had worked for a manufacturer and for a contractor and had learned the insecurity of employment in the non-utility field. In fact, it was not so much employment stability that he was looking for as it was job security.

There are two elements to job security outside of governmental circles: Stability of employer's business and ability of the individual. Because of the essential qualities of electric service and because of energetic selling, the business of electric utilities suffers very little in severe business storms in comparison with other businesses. For that reason utility employment, except perhaps for construction crews, is stable.

Under such a situation, however, there is always the possibility of the operation taking on some of the characteristics of civil service, such as over-employment, under-compensation, and the feeling that with good behaviour it is a job for life.

There is no question but what such a situation has existed. It has brought the evil of seniority in promotion and compensation. Changing economic and regulatory conditions must bring about a situation where individual initiative is encouraged and where employment is on the same competitive basis as any other business. If utilities are to earn a satisfactory return for the investors and at the same time meet higher taxes and costs at lower rates, there can be little room for employment security other than on the basis of performance.

Employment stability is something that utility management can sincerely offer young men applying for work. Job security is not something for management to offer; rather is it something for the individual to earn.

Industrial Electrification Program Needed

NEW INTEREST in promoting industrial plant electrification may be noted among manufacturers and utilities. This is encouraging, for this immense but stagnate market offers unlimited possibilities for business. Unfortunately too little is known about this market because no comprehensive surveys as to obsolescence have been made. Here and there some survey work has been done, but taking industry as a whole very little is known about electrification conditions.

Now is the time to survey conditions, bring out

plans, organize a promotion and sales program and prepare the way for the market that is beginning to come to life. If the electrical industry will do these things, it will get the jump on other industries supplying this market.

When power salesmen report that factories will not buy a motor, a machine tool or other device unless it will pay for itself out of savings in six months, or some other limited period, there is evidence that the psychology of the situation is bad and that the sales strategy, as well as industrial executive thinking, needs correction. Instead of thinking of an individual piece of equipment, salesmen and factory executives should be taught to realize that the production equipment and processes as a whole are obsolete and too expensive to continue in operation.

The broad program on the part of the electrical industry to bring out and show what a modern plant with modern equipment and with modern processes will do to cut costs and open markets for manufactured products is long overdue. Ignorance and lethargy must be overcome and replaced with knowledge and enthusiasm. The electrical industry has a big stake in putting some form of organized promotion of modernized factory electrification to work at this time.

General Motors Knew the Answer

GENERAL MOTORS has its Cadillac, its Buick and its Chevrolet. Ford has his Lincoln, Mercury and Ford. There is an automobile for every income class—all good cars, but differing in certain refinements, size, life, etc. The laboring man who gets eighteen or twenty dollars a week can ride in his own automobile just as well as his employer—and the cost for gasoline is the same for each.

Is there a lesson to be learned here for the electrical industry? The automobile manufacturers were not content to cultivate only the well-to-do market. Their expansion came when the mass market was sold.

An analysis of income groups made by the National Resources Committee shows that less than 2.5 per cent of all incomes are in excess of $5,000 a year, that only 18 per cent are more than $2,000 a year, that 46.5 per cent are $1,000 or less. There will be certain isolated communities where these figures may vary considerably, but by and large this is the distribution of income groups whom the utilities are serving with electricity and upon whom the appliance manufacturers must depend for sales.

As with gasoline for automobiles, the same energy rate is available to rich and poor, the only difference being that to enjoy the lowest rate the consumption must be in the higher brackets. And that is where the rub comes in the utility business.

The poor man can use electricity in place of coal or oil or gas or ice, for the most part at a saving, if he could afford to own the equipment. He represents a mass market for the manufacturer and a profitable market for the utilities.

Some people have taken the position that the cost of current-consuming devices is too high and by the mere lowering of price sufficiently larger markets would result to maintain the same or larger net. That was not the way the automobile manufacturers solved this very same problem, nor does it seem logical for our industry.

There should be no quarrel about the fair value of today's appliances. In fact, considering the demands upon manufacturers for special this and special that, changes here and changes there, perhaps today's prices, if anything, are too low—for what we receive.

May it not be, however, that there is another approach to price for the low-income group—the automobile manufacturers' approach? May it not be that there is a low-income customer design that will provide the same quality of electrical usage, but at a price to fit his economy?

We know that this is not a new idea. We know that attempts have been made along this line to pry the lid off this market, and so far the progress has not been great. In spite of all that, we contend, since this market is of such great importance to all, that we cannot afford to discontinue trying, with added effort for each time there is a failure.

Maybe it would be well to study all of the failures to date. Why didn't the various designs work out? What was wrong? Such a study would not tell us that the low-income market was closed to electrical conveniences, large and small; it would merely divulge some things that, logical as they may appear on the surface, simply won't work.

And then, perhaps, it might be a good thing to learn something at first hand about how these people live. If we of larger incomes try to assess them on the basis of our own living needs, and we do, we are apt to miss the mark entirely.

Any lingering fear that a low-priced design might hurt the demand for the higher priced and now standard product we feel can be banished, for experience has demonstrated that an increased volume in the mass market brought with it greater sales of the superior product.

Manufacturers will point to the steadily lowered price for electrical products. That is right and proper, but it is not the answer to the low-income market. Cadillacs can continually come down in price, but they will not be mass market cars. Our suggestion is a design that can sell at a fraction of the price of the present standard equipment and that is attractive, sturdy and fitted to the needs of the family with a very small income.

This is not alone the problem of the manufacturer. It is equally the problem of the utility. Maybe they can approach it without either being on the offensive or defensive. If they can approach it without bias, but with a mutual desire to get results, maybe they might get what they are looking for.

NEWS OF THE WEEK

Elaborate Plans Made for Annual Convention

Utility representatives from all sections of the country to gather at Waldorf-Astoria for three-day convention in New York — Important problems of industry to be discussed

Electric utility executives from all sections of the country will gather in New York next week for the annual convention of the Edison Electric Institute to be held June 6-8 at the Waldorf-Astoria Hotel.

Pre-convention activities and the scheduled committee meetings on Monday will draw a large number of delegates to the city for the week-end. Because of the World's Fair a record-breaking attendance is expected at the meetings this year.

Session at Fair

A concentrated program has been arranged, with morning sessions planned for Tuesday, Wednesday and Thursday. The session at the World's Fair grounds, at which Grover A. Whalen, president of the fair, will address the visiting utility officials, will be held Tuesday afternoon. The program will get under way at 3 o'clock at the Music Hall. James E. Davidson, president of Nebraska Power Co., will preside at this meeting.

Following the Tuesday afternoon meeting, guided tours of the electric utilities exhibit, the electrified farm and the one of Consolidated Edison Co. of New York, Inc., will be made.

A luncheon meeting has been arranged for Thursday, at which Thomas N. McCarter, chairman of Public Service Corp. of New Jersey and former president of the Institute, will be speaker.

Important committee meetings will be held Monday, including the rate research, sales, operating and Better Light—Better Sight Bureau. The trustees of the Institute are scheduled for a meeting at which official approval will be given to the nomination of President Charles W. Kellogg as the first paid president of the Institute.

Since the convention in Atlantic City last year many new problems confront the industry. Of major importance will be the discussion of war procurement and electric power supply by Gen. Charles Keller. The utilities have co-operated with Assistant Secretary of War Louis Johnson in meeting any possible power shortage in case of a war. There have been reports in Washington recently that the "power bloc" in Congress is striving to push through its movement to build an Eastern grid at a cost of $600,000,000. The grid has the backing of Senator Norris.

Because of the attraction of the World's Fair it is expected that the convention will register more than 2,500 delegates. Reports indicate that there will be large delegations from many companies, especially those from companies nearby.

E.E.I. Convention Program

Monday, Committee Meetings

Rate research; sales committee; Plan, E.E.I., home lighting equipment, sales committee; operating committee; executive committee of Better Light—Better Sight Bureau.

Tuesday, 9:30 a.m.

Opening address by President Charles W. Kellogg.

"Outlook for Real Estate and Building Development," by Roy Wenzlick, president of Real Estate Analysts, Inc. of St. Louis.

"The Outlook for the Electric Utilities," by Floyd L. Carlisle, chairman of Consolidated Edison Co. of New York, Inc.

"Present Status of Television," by Lenox Lohr, president of National Broacasting Co.

Tuesday, 3 p.m.

Music Hall, World's Fair Session.

Presiding—James E. Davidson, president of Nebraska Power Co. and vice-president of E.E.I.

Speakers include Grover A. Whalen, president of the New York World's Fair; Floyd L. Carlisle, Owen D. Young, chairman of General Electric Co.; D. S. Youngholm, vice-president of Westinghouse Electric & Manufacturing Co.; Alfred H. Schoellkopf, president of the Electric Utilities Exhibit Corp.

Wednesday, 10 a.m.

Election of trustees of the E.E.I.

"Progress In Building Rural Load," by H. E. Dexter, vice-president of Central Hudson Gas & Electric Corp. and chairman of the E.E.I. general sales committee.

"War Procurement and Electric Power Supply," by Gen. Charles Keller, Public Utility Engineering & Service Corp.

"Balanced Load Building," by George E. Whitwell, vice-president of Philadelphia Electric Co.

"A Kilowatt-Hour," by C. M. Ripley, General Electric Co.

Thursday, 10 a.m.

Prize awards announcements by H. P. Liversidge, president of Philadelphia Electric Co. and chairman of the E.E.I. prize awards committee. Winners of B. C. Forbes prize, James H. McGraw prizes, R. B. Marshall prizes, Claude L. Matthews valor award, Augustus D. Curtis award, and the National Electric Water Heating Council award.

Presentation of the Charles A. Coffin Award.

"What the Customer Thinks of Utilities," by Elmo Roper, distribution consultant of New York.

"The Case for Central Station Power," by H. M. Sawyer, vice-president of American Gas & Electric Co.

"Human Interdependence," by Dr. Adam S. Bennion, assistant to president, Utah Power & Light Co.

Thursday, 1 p.m.

Luncheon speaker will be Thomas N. McCarter, chairman of Public Service Corp. of New Jersey and former president of E.E.I.

State Sovereignty Ordered Defended

Accusing the Federal Power Commission of attempting to invade North Carolina's sovereignty, Governor Hoey instructed Attorney-General Harry McMullan to intervene in a suit which may determine whether the state or the commission can control the Yadkin River.

The suit was brought by residents of Yadkin County to restrain the city of High Point from constructing a PWA-financed dam on the Yadkin River. Several other similar suits also have been brought against the city. The Yadkin County litigation, however, definitely had raised the question about the control of the river, Governor Hoey said. High Point has taken the stand that it can condemn Yadkin County land adjacent to the river, by virtue of a permit from the power commission, he said.

Governor Hoey specifically instructed Attorney-General McMullan to "challenge the authority of the Federal Power Commission to exercise any control over this river." He declared that if the commission controlled the Yadkin it might obtain control of virtually all other rivers in the state. He pointed out that the Yadkin was non-navigable and not under the jurisdiction of the commission.

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Plans to Refund Entire Funded Debt

Washington Water Power Co., controlled by the American Power & Light Co., is planning to refund its entire funded debt. It is expected to file soon with the SEC a registration statement covering an issue of approximately $20,000,000.

Proceeds will be used to refund the company's $15,498,000 of first and general mortgage 5 per cent bonds due in 1960 and the $4,413,000 of first and refunding mortgage 5s due this year.

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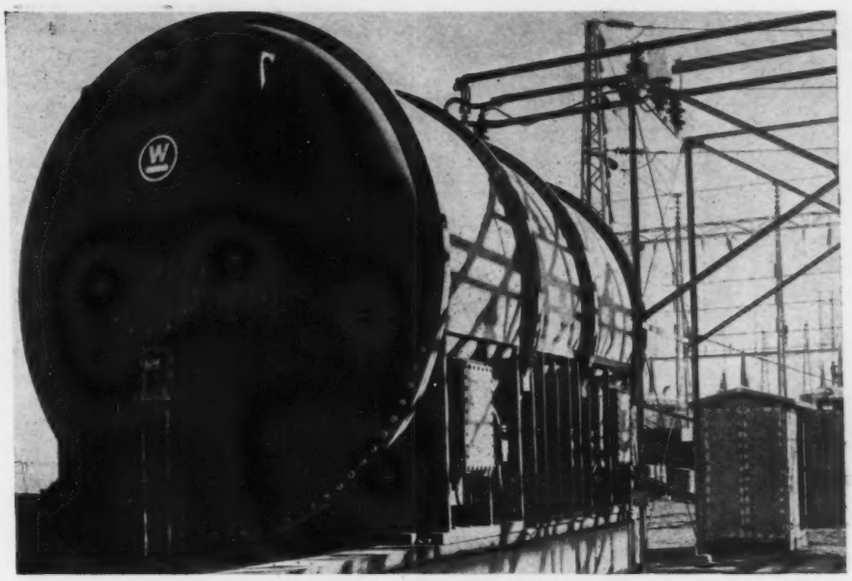
Stays Foreclosure Action

Judge Munger has ordered that the First Trust Co. of Lincoln, Neb., be enjoined from going ahead with foreclosure proceedings against the Gage County Electric Co. until further order. The district court of Gage County has entered a judgment in favor of the First Trust Co. in the amount of $189,568.

The Gage County Electric Co. filed application for permission to reorganize under Chapter 10 of the federal bankruptcy act. The company sells power wholesale to the municipal system at Beatrice and Wymore. Judge Munger's order was issued in answer to application for a temporary stay of advertisement of sale filed by Woods, Aitken & Aitken, attorneys.



NEW INSTALLATION—This new hydrogen-cooled synchronous condenser has been installed by Westinghouse in the Chino substation of Southern California Edison Co. It has a rating of 60,000 and 50,000 kva. on 60 and 50 cycles. Instead of four vertical coolers, one on each side of each bearing, only two coolers are used, arranged horizontally below each bearing

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Refrigerator Sales Rise

Electric refrigerator sales (household models only) for the month of March in the Southeastern states totaled 25,749 units, compared with 17,091 units for the similar month of 1938. Virginia led with a total of 4,710 units, followed closely by Tennessee with 4,623. For the three-month period ended March, this section showed a total of 62,882, compared with 45,487 for the similar period of 1938.

•

Board Permits Utilities to Extend Rural Lines

Wisconsin Power & Light Co. has been authorized by the state Public Service Commission to extend its rural lines in the towns of Burke, Vienna and Springdale, Dane County; Mineral Point and Waldwick, Iowa County; Exeter, Jefferson and Clarno, Green County; Rock, Rock County; Columbus, Columbia County; Seymour and Belmont, Lafayette County and Rushford, Winnebago County.

Northern States Power Co. has been authorized to extend lines in Little Falls, New Lyme and Lafayette, Monroe County.

Los Angeles Plans Utility Expansion

An agreement has been reached between commissioners of the Los Angeles Bureau of Power and Light and officials of the Southern California Edison Co. under which the city will acquire for $5,572,000 the company's distribution properties in 48 territories that have been annexed or consolidated with the city since 1922.

Under the plan of settlement, long in litigation, the city will turn over to the company certain scattered electric-distribution properties outside the city acquired as an incident to the bureau's acquisition of the Los Angeles Gas & Electric Corporation's electric system in 1937. These properties have been valued at $1,078,000. The balance, $4,494,000, will be paid by the city in cash. Under the agreement the company will obtain necessary franchises from the city authorizing the utility to maintain essential crosstown transmission lines and to obtain a tie-in with the city's electric system.

The transaction is subject to approval by the Mayor, City Council, California Railroad Commission and the Los Angeles County Superior Court.

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Starts Power Station

Northern States Power Co. will start construction work on a $1,500,000 steam-turbo-generating plant on lower French Island along the Black River at La Crosse, Wis., in the near future.

MORE ELECTRIC COOKING—A 25 per cent gain in sales of electric kitchen equipment featured the recent annual New England Hotel Exposition at Boston. Eight utility groups co-operated with manufacturers in the display

Kellogg Quits Post as Head of Utility

Charles W. Kellogg, who is to become the first paid president of the Edison Electric Institute on June 7, last week resigned as chairman of Engineers Public Service Co. Mr. Kellogg will remain as a member of the board and will also continue as a director of certain subsidiary companies of the Engineers system.

At the same time T. J. Hanlon, Jr., was elected a director to fill a vacancy. Mr. Hanlon has been vice-president since 1931.

Donald C. Barnes, president, disclosed that a subsidiary, Gulf States Utilities Co., has under consideration the refunding of its $27,300,000 of first and refunding 4 per cent bonds due in 1966. The bonds are callable at 106.

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George W. Lawrence Dies

George W. Lawrence, who recently resigned the presidency of the Western Massachusetts Companies, although continuing as a trustee, died at the Phillips House of the Massachusetts General Hospital in Boston May 28, following a long period of ill-health. He was born in Gardiner, Me., 63 years ago; was graduated from the University of Maine in 1891, and after serving with the General Electric Co. and American Smelting & Refining Co. he joined the Greenfield (Mass.) Electric Light & Power Co. in 1905, occupying various executive posts in the utility group forming the Western Massachusetts system and finally the presidency of the co-ordinated properties. A brief resume of Mr. Lawrence's career was published in ELECTRICAL WORLD April 29, 1939, page 16.

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Approve Dissolution of Tennessee Utility

Stockholders of Tennessee Electric Power Co. have approved the plan for dissolution of the company and for the sale of its electric properties to the TVA. Commonwealth & Southern Corp. owns 64 per cent of the voting stock.

The dissolution provides for the transfer of the assets of the company to Tennessee Utilities Corp., a new company. Tennessee Utilities has been authorized to issue $9,400,000 of capital stock, to be exchanged for the common stock of Tennessee Electric Power.

Under the plan holders of Tennessee Electric Power bonds will receive par by funds received from TVA and municipalities and co-operatives. Holders of the preferred stock will receive $100 a share, plus accrued dividends.

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Last Dam Gate Dropped

The last gate at the Appalachian Electric Power Co. dam on New River was dropped on May 22 to impound the waters for generating electricity and to form a mammoth lake.

Opposition Voiced to TVA Deal Bill

Opposition to the pending Norris bill, which would authorize the TVA to take over the properties of Tennessee Electric Power Co., has been voiced not only in the subcommittee of the House military affairs committee, but from coal operators and associations.

Opinion is that in order to avoid heavy loss and eliminate one of the major sore spots in the national power picture some sort of enabling legislation will be passed before the June 20 deadline, the time when the actual transfer is to take place.

Wendell L. Willkie, president of Commonwealth & Southern Corp., told the subcommittee that if the deal fails the destruction of property values will be appalling. "It would adversely affect the security market and the national economy," he said.

Some efforts to place a rider on the bill which would allow the TVA to reimburse local taxing agencies for loss of revenue occasioned by the utility purchase have met with opposition from TVA proponents. Gov. Prentice Cooper said that he had a statement from the TVA promising to make good the loss in taxes.

Coal operators and miners see a tremendous loss in coal use in the use of TVA's water power instead of the power generated at the utility's steam plants.

•

Proposes to Refund Bonds

Refunding operation involving issuance of $26,367,500 of 4 per cent first mortgage 30-year bonds, proceeds of which will be used to retire approximately the same amount of bonds, is the object of an application filed by the Shawinigan Water & Power Co., Ltd., with the Quebec Electricity Board.

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Texas Power Consumption

Consumption of electric power in Texas during March declined slightly from February, but was moderately above March last year, according to the Bureau of Business Research of the University of Texas. Reports to the Bureau from a representative group of Texas power companies indicate an increase in electric power consumption during March of 2.9 per cent over March, 1938, but a decline of almost 1 per cent from the preceding month; while first quarter consumption gained 4.6 per cent over the corresponding period a year ago.

Roosevelt Asks Utilities to Cooperate on Power

Issues challenge to managements to prove their willingness for wider distribution of electricity at lower costs by accepting plan of New York Authority for St. Lawrence and Niagara Rivers

Private utilities were asked last week by President Roosevelt to lend support to the development of the St. Lawrence water power project by following the suggestions of the New York State Power Authority.

Mr. Roosevelt at his press conference challenged the managements of electric utilities to prove their willingness to co-operate with the government by accepting the plan to co-ordinate public and private power production and distribution as outlined in the authority's report to Governor Lehman and the New York Legislature.

To Test Willingness

"The Power Authority's report is obviously drafted to test the willingness of the private utilities to co-operate with government agencies in a program of expansion in order to make possible the widest possible use of electricity at the lowest possible cost," Mr. Roosevelt said.

President Roosevelt did not overlook the opportunity to express his hope that there would be an early agreement between the United States and Canada on the proposed St. Lawrence waterway treaty.

In hurling his challenge to the utilities Mr. Roosevelt quoted Clarence E. Groesbeck, chairman of Electric Bond & Share, from the annual report that "the objectives of both government and the utilities must be the widest possible use of electric service at the lowest possible economic cost, and that the achievement of this end and the solution of the existing problem of competition lie in co-operation between government and the privately owned electric utilities and the co-ordinated use of the existing generating and transmission facilities."

Mr. Roosevelt said that Mr. Groesbeck had stated in the annual report that "such a program would go far beyond the direct benefits which should accrue and would be helpful in encouraging general business expansion and increasing employment."

It was pointed out by President Roosevelt that the Power Authority's report is obviously drafted to test the willingness of the private utilities to co-operate with government agencies in a program of expansion.

Indications were given by the President that it is not necessary to obtain consent of Canada to the treaty before the plan of the New York agency can be put into effect. He said that "the first step in the further development of the Niagara River could be undertaken before a new treaty with Canada is made." However, he added that "the full advantage of the authority's proposal for the co-ordination of the St. Lawrence and Niagara developments could not, of course, be realized before the conclusion of the treaty."

Copies of the authority's report were forwarded to the chairman of the Senate and House military committees for consideration. The move was believed to be another effort to revive the St. Lawrence project.

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Boulder Dam Power Rates to Be Changed

Radical revision of the plan for the handling of power at the Boulder dam will be sought at this session of Congress.

It is proposed that the Bureau of Reclamation handle all operations at the dam and sell power at the bus bar. It is proposed to reduce the interest rate from 4 to 3 per cent. Money expended during the construction period cost the government only slightly more than 2 per cent. It is proposed to use the actual cost in readjusting rates. The Secretary of the Interior would determine a reasonable allowance for operation and maintenance. Arizona and Nevada would receive $300,000 each rather than a percentage. The sum of $500,000 would be provided for the Colorado River development fund.

Congress also will have to pass on the question as to the source of funds for maintenance work on the lower Colorado river. The absence of floods has resulted in shoaling. Some damage already has been done to the levees. The question is whether the money for that work should come out of the revenues collected at Boulder Dam or should be handled as regular river and harbor projects for which specific appropriations are made.

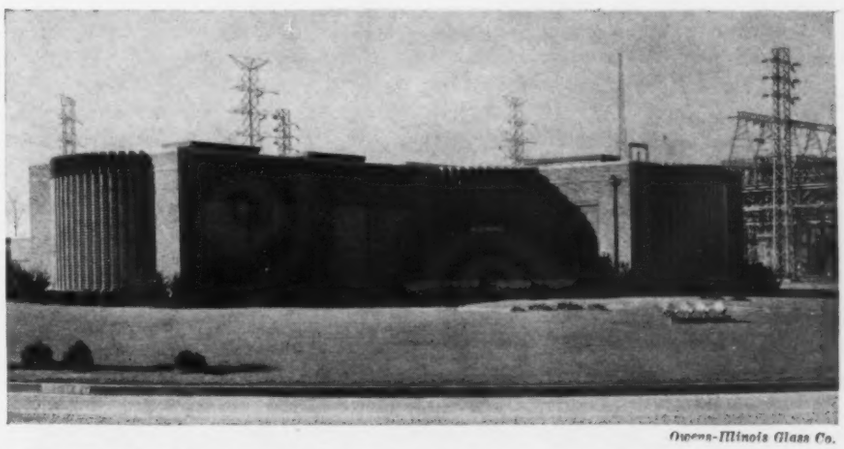
It is now apparent that Lake Mead will not reach the spillway level this year. The lake was drawn down some earlier in the year.

•

Pacific Gas Will Accept Rate Order

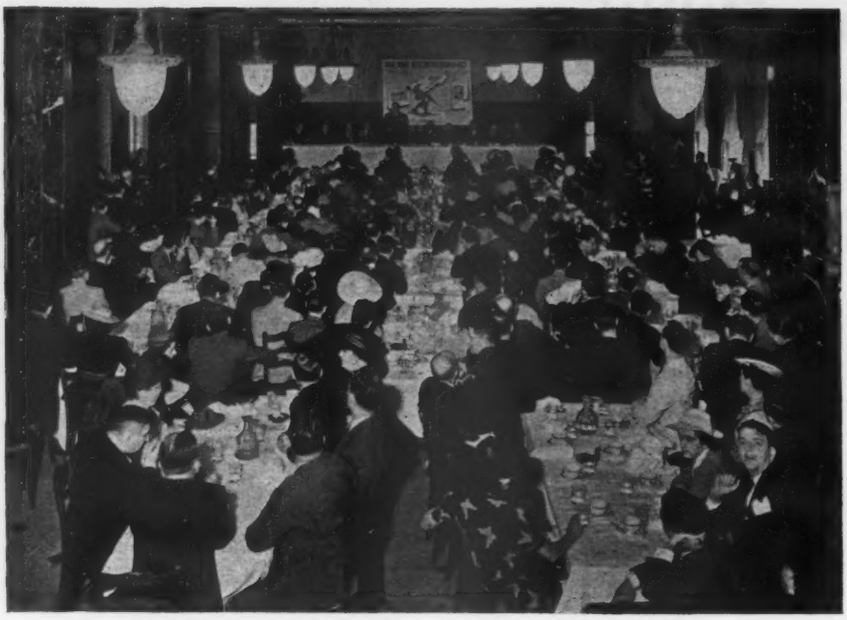
Pacific Gas & Electric Co. announced that it was decided not to appeal from an order of the California Railroad Commission issued in 1933 for a cut in gas rates which has been held in abeyance by litigation since that time. As a result, about 470,000 customers who were supplied with natural gas between July, 1933, and April, 1936, will receive refunds of impounded revenues in excess of the rates ordered by the commission with interest of 4 per cent annually.

In the three years the company set aside $5,980,000 in excess revenues. Interest on this amount will bring total refunds to more than $7,000,000. Reserves for contingent refunds have been maintained by the company since the case started in 1933.



Owens-Illinois Glass Co.

NEW SUBSTATION—Beauty of functional design was accomplished by the application of Insulux glass blocks in the two large bays and panels in side walls of the new substation of Memphis Light & Water Co.



START SALES DRIVE—More than 300 dealers and utility employees seen at the first of a series of breakfast meetings conducted by New Orleans Public Service Co. in connection with the "Scotch Eskimo" refrigerator drive

Allis-Chalmers Seeks to Settle Walkout

All production at the West Allis plant of Allis-Chalmers halted last week and 6,500 workers were idle. The workers left the plant Wednesday afternoon in what the union's Local 248 of UAW and Local 613 of United Electrical Radio Machine workers (CIO) called a work holiday and the company called a strike.

Union committees at Allis plants in Boston and Pittsburgh approved the action, but no walkout has yet occurred in these plants.

Carl L. Gill of the federal government stepped into the situation Thursday night after the union requested Secretary Perkins to intervene. The walkout occurred after several weeks of negotiation with CIO leaders for a renewal of contract involving a union shop and sole CIO bargaining rights for all Allis-Chalmers plants. The strike or walkout occurred after the union had voted strike powers to its committee last Saturday.

Allis executives, union officials and Mr. Gill are meeting in an endeavor to reach agreements.

•

RFC Extends Appliance Aid

Jesse Jones, chairman of the RFC, has announced that to aid small business further Electric Home and Farm Authority is extending its service to include the purchase of installment contracts covering gas appliances for domestic use. As of April 30, EHFA had purchased 115,565 installment contracts covering electrical appliances from 2,947 dealers in 33 states, aggregating $17,566,391 of which $9,103,889 has been repaid.

•

Seek to Suspend Service on Interurban Lines

Permission to suspend service on Portland Electric Power Co.'s interurban electric lines between Portland and Oregon City, Gresham and Boring has been sought by the company's trustees through a petition filed in the federal district court recently. A petition for reorganization of the company is now pending in this court. The trustees declare in the petition that the company is sustaining an actual loss of $6,000 per month on the operation of these interurban lines.

•

Sells $13,000,000 Bonds to Insurance Companies

Montreal Light, Heat & Power Consolidated has placed privately with five life insurance companies in the United States and Canada an issue of $13,000,000 first mortgage and collateral trust per cent bonds, due 1969. The bonds are payable as to principal and interest in Canadian funds. Proceeds will be applied to the redemption on July 1 of approximately $12,000,000 of Cedar Rapids Manufacturing & Power Co. 5 per cent bonds, due 1953, guaranteed by Montreal Light, Heat & Power Consolidated.

Utah Power & Light Starts Sales Drive

Quotas of 1,500 electric ranges, 750 water heaters and 600 IES lamps have been set for a three-month co-operative drive which started March 1 by Utah Power & Light Co. and dealers in its territory. Feature of the campaign is a $25.10 set of Mirro aluminum cooking utensils given with each electric range. To offset the cost of this $8 has been added to the list price of all range models.

The campaign is being promoted by an extensive newspaper advertising program and a special series of weekly radio broadcasts which will be supplemented by spot radio announcements. An $8,000 promotional fund, of which distributors contributed $1,000, has been set up. Extra commissions have been provided for the power company salesmen on both company and dealer range sales and monthly and grand prizes will be awarded on the basis of highest percentage of quota achieved by individual salesmen.

Ranges included in the program include General Electric, Westinghouse, Hotpoint, Norge, L. & H., Frigidaire, Kelvinator, Monarch, Estate, Sears and Montgomery-Ward.

The campaign has been dubbed "Up-We-Go," to tie in with Utah Power & Light's 1939 sales slogan, "An Upward Line in '39."

•

Utilities Reduce Rates to Rural Co-operatives

Carolina Power & Light Co. has agreed to a 23 per cent reduction in wholesale rates to be charged the Anson, Haywood and Randolph Counties rural electric co-operatives, according to Stanley Winborne, North Carolina Utilities Commissioner.

Rural electric co-operative corporations in Arkansas will receive a reduction of 28 per cent in wholesale rates for electricity furnished them by the Arkansas Power & Light Co., effective July 1, it has been announced following a conference among REA officials, members of the state utilities commission and officials of the Arkansas Power & Light Co.

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Plans New Rural Lines

Arkansas Power & Light Co. has asked the Arkansas Utilities Commission for authority to construct approximately 35 miles of rural electric lines in Mississippi County to serve about 118 customers. The project will cost $21,444.

Sharp Gain Shown in Farm Customers

Electric service from all sources was being received on 1,406,579 farms at the end of 1938, indicating an increase of 165,074 over the 1,241,505 at the end of the preceding year, according to a tabulation published by the Edison Electric Institute.

Farm Service *

Number and Percentage of Farms Receiving Electric Service as of December 31, 1938

State	Farms Receiving Electric Service	Percentage Electrified (A)	Percentage Electrified (B)
United States	1,406,579	21.9	32.5
Maine	18,200	45.4	51.3
New Hampshire	10,143	59.2	62.3
Vermont	9,008	35.0	37.6
Massachusetts ..	21,492	64.9	66.2
Rhode Island ..	4,000	98.1	100.1
Connecticut	21,000	71.2	72.0
New England	83,843	56.0	59.3
New York	93,332	55.5	57.6
New Jersey	21,200	73.6	74.8
Pennsylvania ...	96,034	51.6	54.4
Middle Atlantic ..	210,566	54.9	57.4
Ohio	104,384	42.7	46.6
Indiana	66,447	34.3	38.9
Illinois	58,898	26.2	28.9
Michigan	103,712	54.9	60.0
Wisconsin	67,590	34.7	37.4
E. North Central..	401,031	38.3	42.1
Minnesota	21,910	11.1	12.3
Iowa	46,973	21.9	22.7
Missouri	33,423	12.5	16.4
North Dakota ..	3,449	4.5	5.2
South Dakota ..	3,380	4.3	5.2
Nebraska	15,982	12.4	13.5
Kansas	20,423	12.5	14.7
W. North Central.	145,540	12.9	14.9
Delaware	3,045	30.0	32.3
Maryland—D. C.	16,765	39.0	44.2
Virginia	28,140	15.1	21.3
West Virginia ..	13,163	13.1	18.4
North Carolina..	37,883	13.5	24.4
South Carolina .	17,098	11.1	29.5
Georgia	21,157	8.9	24.8
Florida	10,692	17.9	29.8
South Atlantic ...	147,943	13.8	25.3
Kentucky	15,730	6.1	11.7
Tennessee	26,648	10.7	21.7
Alabama	27,764	10.8	32.0
Mississippi	7,587	2.6	10.0
E. South Central..	77,729	7.3	18.5
Arkansas	9,271	3.9	11.3
Louisiana	8,393	5.1	15.2
Oklahoma	14,615	7.3	14.5
Texas	34,796	7.6	13.6
W. South Central.	67,075	6.3	13.6
Montana	4,847	10.5	17.7
Idaho	21,428	51.1	69.6
Wyoming	2,079	12.6	20.2
Colorado	11,911	20.2	29.0
New Mexico ...	2,300	6.0	11.5
Arizona	7,082	40.1	56.2
Utah	19,172	73.2	89.8
Nevada	1,271	37.8	50.5
Mountain	70,090	28.2	42.2
Washington	50,184	61.9	76.3
Oregon	32,578	53.3	66.3
California	120,000	90.5	106.7
Pacific	202,762	73.8	89.2

(A) Compared with all farms occupied, Census of Agriculture, 1935.
(B) Compared with Farms with dwellings valued over $500.
* Edison Electric Institute.

The final figures differ slightly from the estimates on page 87 of ELECTRICAL WORLD's Annual Statistical Number of January 14, 1939.

The Institute's compilation also shows the total number of occupied farms, the number with dwellings valued at more than $500 and the percentage electrified as computed on each basis. It is seen that electric service was being received by 32.5 per cent of the number that had dwellings which were more than simple cabins. In New England the ratio rose to 59.3 per cent and in the Pacific States to 89.2 per cent.

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Offering Oversubscribed

Oversubscription of the issue of Pacific Lighting Corp. $5 dividend preferred stock has been announced by Blyth & Co., Inc., who headed a national syndicate which recently offered the shares publicly. The amount of the public offering was 38,919 shares, the remainder of the issue of 200,000 shares having been taken by present stockholders under the exchange offer which terminated May 11.

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Doubles Building Budget

L. E. Hayes, Janesville district manager of Wisconsin Power & Light, announced that $114,610 will be spent for reconstruction work in the territory this season. This budget is double the 1938 work. Major items in the program are the purchase of electric and gas meters and transformers. A 12,000-volt line will be built and rural extensions made.

Increase in Quakes Laid to Boulder Dam

Power sales from Boulder Dam so far this year have almost doubled those in the same 1938 period, amounting to about $900,000 for the first quarter, against $480,000 in the same period last year. The installation of additional generating equipment and the ample supply of stored water made it possible to generate 450,000,000 kw.-hr. during the quarter, a fourth of which was purchased by Los Angeles.

Admiral L. O. Colbert, director of the Coast and Geodetic Survey, recently disclosed during House hearings on appropriations for the Commerce Department that Boulder Dam and the waters of the Colorado River which have backed up behind it to form Lake Mead have caused a sharp increase in earthquakes. Admiral Colbert said that there were no records of any earthquakes in the area in the ten years prior to the filling of the lake.

A total of 65 quakes were felt in 1936 and 1937 and 505 during 1938, of which 55 were strong enough to be felt by persons living near the lake.

•

Plans to Revise Structure

Central and South West Utilities Co., largest unit in the Middle West Corp.'s system, is drawing plans for recapitalization, Gail Belden, president, revealed recently in a report to stockholders. Mr. Belden said the proposed recapitalization would eliminate dividend arreas and provide a simple corporate structure.

GUILLOTINE—Consolidated Edison of New York is using this effective method of destroying ancient ice boxes which have been replaced by modern mechanical refrigeration in its "Old Ice Box Round-Up" sales drive

Executives Address Safety Conference

Speakers at the twelfth annual Fox River Valley and Lake Shore Safety Conference, May 25, at Sheboygan, Wis., included W. J. Hodgkins, president Lake Superior District Power Co., Ashland, Wis., who discussed "Safety Pays a Dividend," and G. C. Neff, president Wisconsin Power & Light Co., Madison, who spoke on "Safety from the Standpoint of the Executive."

L. P. Fessenden, district manager Wisconsin Power & Light Co., Sheboygan, was chairman of the public utilities section of the meeting, while Arthur C. Kaems, head of distribution, Wisconsin Power & Light Co., acted as leader of the discussion.

The one-day meeting attracted about 1,500 persons. The 1940 conference will be held in Marinette, Wis.

•

Appliance-Wiring Contracts Closed

Electric Home and Farm Authority announced that contracts have been closed with College Park, Ga.; South Alabama Electric Membership Corp., Troy, Ala.; Jasper County Rural Electric Membership Corp., Rensselaer, Ind.; Pea River Electric Membership Corp., Clayton, Ala., and Fayette-Union County Rural Electric Membership Corp., Liberty, Ind. Contracts provide that EHFA and the co-operatives will co-operate in financing the sale of electrical appliances.

The authority also closed contracts with the Humboldt County Rural Electric Co-operative, Humboldt, Iowa; Calhoun County Electric Co-operative Association, Rockwell City, Iowa; Satilla Rural Electric Membership Corp., Alma, Ga., and the Jasper County Rural Electric Membership Corp., Rensselaer, Ind. Contracts provide that the authority and co-operatives will co-operate in financing the wiring or rewiring of existing homes and farms. The foregoing co-operatives are already co-operating in the financing of electrical appliances.

•

Employees' Flower Show

From 60 to 75 floral exhibits adorned the main floor of the Alabama Power Co. offices in Montgomery recently in a flower show which B. B. Marsh, district manager, pronounced one of the first in Montgomery to be presented by an employee group. The flowers were furnished from the home gardens of company employees. It is their intention, Mr. Marsh declared, to have such exhibits semi-annually, one in the spring and one in the early fall, to develop among employees an even wider interest in home gardens and decoration.

•

Vermont Group to Meet

The Vermont Electrical Association will hold its annual meeting on June 8 at the Woodstock Country Club, Woodstock, Vt. Election of officers will be held at this one-day meeting.

•

Visit Plant in Rome

Last week the Central New York Purchasing Agents' Association held its meeting in Rome, N. Y., at which time a tour was made through the plants of Revere Copper & Brass, Inc. The purchasing agents were guests of the company for a luncheon at the Teugega Country Club.

MEETINGS

Edison Electric Institute—Annual convention, Waldorf-Astoria Hotel, New York, N. Y., June 6-8. Bernard F. Weadock, managing director, 420 Lexington Ave., New York, N. Y.

Wisconsin Municipal Utilities Association—Annual convention, Plymouth, Wis., June 6-7. J. J. Jedwabny, secretary, Menasha, Wis.

International Commission on Illumination—Scheveningen, Holland, June 12-21. U. S. National Committee, A. A. Brainerd, executive secretary, c/o Philadelphia Electric Co., Philadelphia, Pa.

Public Utilities Advertising Association—Annual convention, Belmont Plaza and Waldorf-Astoria Hotels, New York, N. Y., June 18-21.

Advertising Federation of America—Annual convention and exposition, Waldorf-Astoria Hotel, New York, N. Y., June 18-22. Henry Obermeyer, chairman program committee, c/o Consolidated Edison Co., New York.

Society for the Promotion of Engineering Education—Annual meeting, June 19-23, State College, Pa.

Canadian Electrical Association—Annual meeting, Digby, Nova Scotia, June 21-24. B. C. Fairchild, secretary, 804 Tramways Bldg., Montreal, Que.

Economics Conference for Engineers — Annual meeting, Stevens Engineering Camp, Johnsonburg, N. J., June 24-July 3.

American Society for Testing Materials—Annual meeting and fifth exhibit of apparatus and instruments. Chafonte-Haddon Hall, Atlantic City, N. J., June 26-30. R. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

American Institute of Electrical Engineers—Combined summer and Pacific Coast convention, San Francisco, Calif., June 26-30. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

Michigan Gas & Electric Association — Annual meetings, Mackinac Island, Mich., June 29-July 1.

International High-Tension Conference—Bi-annual meeting, Paris, France, June 29-July 8. F. Attwood, president American National Committee, Ohio Brass Co., New York, N. Y.

American Society of Heating and Ventilating Engineers—Semi-annual meeting, Mackinac Island, Mich., July 4-6. Society Headquarters, 51 Madison Avenue, New York, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, San Francisco, Calif. July 10-15. C. E. Davies, national secretary, 29 West 39th St., New York, N. Y.

Underwriters' Fees Regulation Amended

New requirements effective July 1, 1939, respecting statements as to underwriter's and finder's fees in applications for authorization of the issuance of securities or the assumption of liabilities by utilities under its jurisdiction are set forth by the Federal Power Commission in an amendment to its rules of practice and regulations for administration of the Federal Power Act which have been in effect since June 1, 1938.

Under the new requirements the statement as to fees must include:

Name and address of each underwriter, amount underwritten and the amount of the underwriter's fee therefore; name and address of each known person receiving or entitled to a fee (other than an underwriter's fee) paid for services (other than attorneys, accountants and similar technical services) in connection with the negotiation or consummation of an acquisition, issue or sale of securities, or for services in securing underwriters, sellers or purchasers of securities and the amount of such finder's fee; affiliation, direct or indirect, through directors, officers, or stockholders, or through ownership of securities or otherwise, existing between applicant and any such underwriter or finder; facts showing that the applicant has, in an adequate manner, publicly called for and has made appropriate and diligent effort to obtain competitive bids in connection with the underwriting and sale of the securities issued; facts showing that such effort was without results necessitating other methods of underwriting, and lastly, in case a finder's fee is involved, the facts showing the necessity for the employment of the finder, the services rendered and the reasonableness of the fee.

•

FPC Denies Postponement

Finding that good cause has not been shown for a further continuance, the Federal Power Commission has denied the petition filed by J. R. Harmon, counsel for respondent, for continuance from May 29 to July 31 of the hearing on investigation of the rates charged by the Interstate Power Co. to the Albany Lighting Co. for the transmission or sale of electric energy distributed in Albany, Ill. Hearing was held May 29.

•

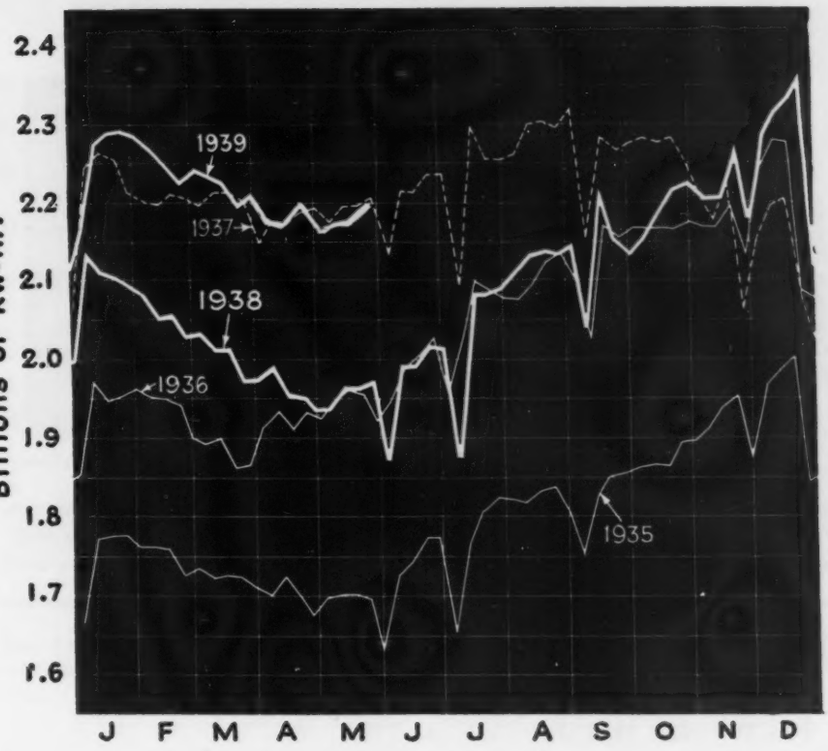
Subject to Excise Tax

Rural electric membership co-operatives in Alabama will be subject to the state's excise tax of 4 mills on each dollar of gross sales, in addition to ad valorem taxes on property the State Tax Commission has announced. The state heretofore has collected ad valorem taxes but made no effort to collect the 4 mill levy on public utilities.

Output Goes to 1937 Level in Strong Rise

Production of energy by the electric light and power industry turned up sharply in the week ended May 27, to 2,204,858,000 kw.-hr., exceeding last year's figure for the corresponding week by 11.7 per cent and almost matching that of the record year 1937, according to statistics reported by the Edison Electric Institute.

The jump of more than 34,000,000 kw.-hr. compared with the week of May 20, or 1.0 per cent, vigorously confirms the upward trend that had been mildly indicated in the recent past. In both of the past two years the curve was rising at this season. The present rise is more pronounced; the gain over 1938 is the largest in four weeks and the approach to 1937 the closest in five weeks.



Weekly Output, Millions Kw.-Hr.

1939	1938	1937
May 27...2,205	May 28...1,973	May 29...2,207
May 20...2,170	May 21...1,968	May 22...2,199
May 13...2,171	May 14...1,968	May 15...2,195
May 6...2,164	May 7...1,939	May 8...2,176
Apr. 29...2,183	Apr. 30...1,939	May 1...2,194
Apr. 22...2,199	Apr. 23...1,951	Apr. 24...2,188

Per Cent Change from Previous Year

Region	Week Ending May 27	May 20	May 13
New England	+13.2	+11.1	+ 9.2
Middle Atlantic	+10.6	+10.3	+11.1
Central Industrial	+14.2	+12.0	+10.0
West Central	+ 6.2	+ 3.6	+ 3.4
Southern States	+ 9.0	+ 8.1	+ 9.0
Rocky Mountain	+13.0	+10.5	+12.5
Pacific	+ 8.9	+11.6	+14.6
United States	+11.7	+10.3	+10.3

Substantial gains appear in the increments over 1938 in all regions except the Pacific, the most important being in New England, the Central Industrial and Mountain States.

British Grid Reports Operations for Year

During 1938 the total capital saving from the Central Electricity Board's program of reduction of reserve generating plant was approximately £22,000,000, or nearly three-quarters of the capital expenditure on Great Britain's Grid scheme to date, according to the eleventh annual report of the board.

Total output from public supply stations in Great Britain in 1938 was 24,376,000,000 units, as compared with 22,902,000,000 units in 1937, an increase of about 6.5 per cent. At the end of the year (the Grid comprised 4,378 miles of transmission lines, of which 2,994 miles were operated at 132 kv. and the remainder at 66 kv. and lower, and 304 switching and transforming stations, with an aggregate transforming capacity of 10,442,000 kva. Total installed capacity at the end of 1938 was 8,264,160 kw.; maximum load at the peak of the winter demand was 6,700,400 kw.

Arrangements were perfected for a national control organization at the Bankside control room in London and during the latter part of the year the Grid in all of the nine areas was normally operated as one interconnected system. Interconnection made it possible so to control the operation of the 171 generating stations under the direction of the board that only 30 ran for the full year. Fourteen of the most economical stations supplied 50 per cent of the total units generated.

Arrangements were made for the installation of a net addition of 824,500 kw. of generating plant and of boiler plant having an aggregate capacity of 11,057,000 lb. per hour, at a total estimated capital expenditure of around £14,500,000.

A new "selected station" is to be built at Little Barford; the first section is to be ready for commercial operation in the autumn of 1941 with an initial installation of two 30,000-kw. generating sets and three boilers each having an evaporative capacity of 300,000 lb. per hour. A new station "B" is to be built at Ipswich, in time for operation in the autumn of 1942.

•

Parker Dam Contracts

Contracts are being awarded by the Bureau of Reclamation for transmission line materials to be used between the Parker dam and Phoenix. While power will not be developed at the Parker dam for two years, the line is to be used to carry power from the Boulder dam to the Salt River valley, where a water shortage has developed. Additional power is needed for pumping purposes. Plans call for the operation of the new line before the end of September.

•

Suggest Capital Changes for N. E. Public Service

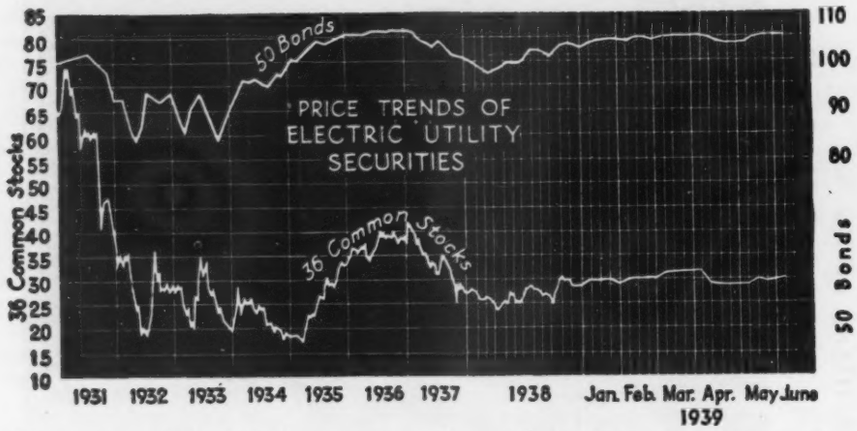
Two directors of New England Public Service Co., Matthew Lahti and Jerome Preston, who are retiring from the board because of requirements of the Public Utility Holding Company Act, have addressed a letter to holders of the company's prior lien preferred —to represent which they were elected directors in June, 1935—in which they express the opinion that "immediate reorganization is both necessary and desirable." Despite repeated requests to the management to act on such a matter, they state, no real steps have been taken.

•

Primary Load Up 5.7%

Hydro-Electric Power Commission of Ontario reports primary load for all systems in March at 1,409,838 hp., against 1,333,928 hp. last year, an increase of 5.7 per cent.

Stocks and Bonds Continue Advances


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
50 Bonds
1931 1932 1933 1934 1935 1936 1937 1938 Jan. Feb. Mar. Apr. May June 1939

Gains were made by both electric utility stocks and bonds during the week, with the "Electrical World" stock index up 0.8 point to 30.6, equaling the mark for the week ended April 1. Bonds advanced more cautiously, the index rising 0.2 point to 105.4

Financing Programs Filed by Utilities

Central Illinois Electric & Gas Co. has filed an application with the SEC, asking exemption from the necessity of filing a declaration in connection with a proposed issue and sale of $14,750,000 of first mortgage bonds due in 1964 and $3,000,000 of serial notes.

The company proposes to redeem $13,909,000 of 5 per cent first and refunding mortgage bonds, due in 1951; $746,000 of 6 per cent first and refunding mortgage bonds, due in 1952; redemption of $2,000,000 of 3¾ per cent collateral notes. The balance will be applied to capital additions, improvements to property and facilities of the company at Rockford, Ill.

Rochester Gas & Electric Co. has filed a registration statement, covering $8,323,000 of 3¼ per cent general mortgage bonds, Series J, due on March 1, 1969. Proceeds of the issue, together with other funds, will be used to redeem $8,323,000 of 5 per cent general mortgage bonds, Series E, due on March 1, 1962.

Application seeking approval for the sale by the Traction Light & Power Co. of Indianapolis of its electric utility property to the Central Indiana Power Co. and Public Service Co. of Indiana has been filed.

New York State Electric & Gas Corp. has filed an application for an exemption from the necessity of filing a declaration in connection with the proposed issuance of a $300,000 note. The note will be secured by not in excess of $400,000 of 4 per cent first mortgage bonds, due 1965, and will be issued to the REA. Proceeds will be used for the purpose of financing the business of the company.

SEC has announced that a series of declarations and applications had been filed under the Holding Company Act in connection with the proposed sale by Atlantic Seaboard Corp. of its investments in its subsidiary companies to Columbia Gas & Electric Corp. Atlantic Seaboard Corp. is a wholly owned subsidiary of Columbia Gas & Electric Corp.

•

Expected to Drop Sale of Debentures

West Texas Utilities Co. has filed an amendment to its registration statement with the SEC indicating that public offering of the utility's $4,000,000 of serial 2½ per cent to 4 per cent debentures had been abandoned and that the interest rate on its $18,000,000 of first-mortgage bonds would be 3¾ per cent.

Reference to a contract to be entered into with certain banks calling for a $4,000,000 loan against a like principal amount of 3⅛ per cent promissory notes, indicated a private agreement instead of a debenture issue. The contract is to be supplied later.

•

File $50,000,000 Claim Against Midland United

Claims for more than $50,000,000 were filed in federal district court at Wilmington, Del., by trustees of Midland Utilities Co., against the Midland United Co., which had controlled Midland Utilities. It is claimed that Midland Utilities was stripped of cash and securities and placed in debt by guaranteeing actions of its parent company. Both companies were thrown into bankruptcy in June, 1934, with the same trustees named for both corporations who continued in control until October, 1938.

In contrast with the involved affairs of the two holding units the operating companies which they controlled are said to be still sound and going utilities.

•

Approve $26,500,000 Issue

Indiana Public Service Commission has approved a petition of the Indiana and Michigan Electric Co. to float a $26,500,000 bond issue. Proceeds are to be used in a refinancing plan. The loan, to be advanced by a group of insurance companies, would be used to redeem the $19,524,000 mortgage bonds 5s of 1955 and the $5,959,000 first 5s of 1957. The Michigan commission must also approve the issue.

•

Reduces Outstanding Debt

Announcement has been made by J. S. Carson, vice-president, that American & Foreign Power Co., Inc., paid off on May 15 an additional $2,500,000 on its outstanding notes payable to banks and Electric Bond & Share Co. This payment reduced the original $50,000,000 bank loan indebtedness to $24,000,000 of which $19,200,00 is now held by banks and $4,800,000 by Electric Bond & Share Co.

•

SEC Amends Rule on Fees

SEC has amended Rule U-12F-2 under the Holding Company Act, which deals with the payment of fees to associates and affiliates in connection with an acquisition or sale of securities.

Utility Reports

	Net Income 1939	1938
*Alabama Power	$3,788,308	$3,517,353
§American Pwr. & Lt. and subs.	9,433,935	11,583,363
*Commonwealth & Southern and subs.	13,750,982	13,366,676
*Connecticut Lt. & Pwr.	3,715,277	3,632,758
†Federal Lt. & Trac. and subs.	1,463,090	1,451,786
*Georgia Power	5,202,940	4,488,621
‡Middle West Corp. and subs.	2,571,358	2,147,714
†National Pwr. & Lt. and subs.	8,170,087	8,969,138
†New York State Elec. & Gas	2,683,722	2,079,293
†Pennsylvania Elec. and subs.	1,874,638	1,657,475
†Standard G. & E. and subs.	2,168,970	3,470,379
*Tampa Electric	1,493,200	1,504,846
*Tennessee Elec. Pwr.	2,839,636	2,677,974

*Twelve months ended April 30.
†Twelve months ended March 31.
‡Three months ended March 31.
§Twelve months ended January 31.

OPERATING PRACTICES

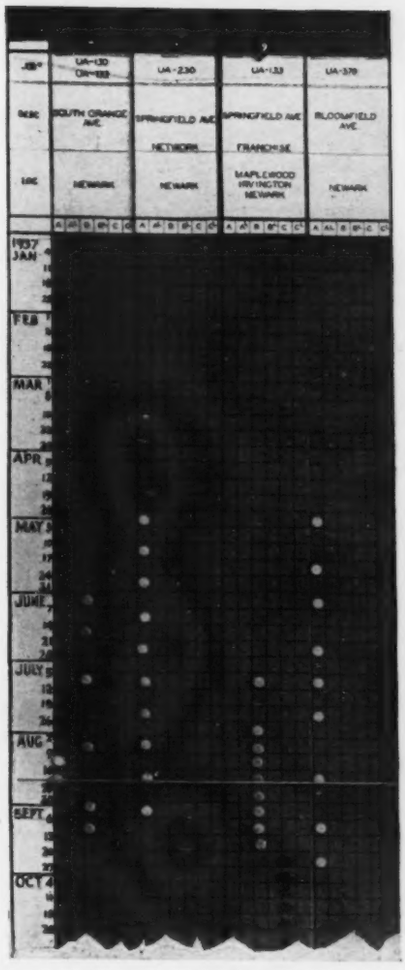
Wall Board Shows Construction Status

By WILLIAM E. TENNYSON
Assistant Engineer
Underground and Transmission Construction Department
Public Service Electric & Gas Company,
Newark, N. J.

Systematic scheduling and progress records of construction have been found very helpful to the underground and transmission construction department of the Public Service Electric & Gas Company in providing a stable program for its construction forces. The schedule is worked out for about eighteen months in advance and, by reference to it, the executives can see when additional work will be required, the engineers will see when plans and material are to be ready and the construction supervisors plan the movement of their forces.

The schedule board consists of 92 strips of cork, 4 ft. long x 2 in. wide x ½ in. thick, fitted vertically into a wall-mounted frame so that the strips may be interchanged. Along the right and left margins of the board are the dates of each Monday for eighteen months, with space across the top for titles and across the bottom for remarks. When a new job is received a 2 x 5-in. title card is prepared on white cardboard, using quarter inch letters, and the card placed at the top of a blank cork strip. From the estimate a preliminary schedule is worked out and shown on the board by strips of paper on the cork strip opposite the marginal dates the work is to be in progress and the strip fitted into its proper place on the board.

When final plans for a job are completed the preliminary schedule is adjusted to the plans and colored thumb tacks substituted for the paper strips. Pink thumb tacks are used for conduit, yellow for cable and blue for service equipment work, with the number of men to be assigned to the job marked on the heads of the thumb tacks. One thumb tack is used for each week the work is to be in progress, thus a glance at the board shows what classes of work are to be done, when each will be in progress and the number of men assigned. A cord is stretched across the board for the current week which readily indicates all jobs in progress. The time required for the various operations is determined by factors obtained from studies of past performances.



Quick check on status of construction projects

This illustration shows only four of the 92 vertical cork strips that compose the schedule board.

About three times a year the dates are moved up so that the first week of the current month is at the top of the board and additional dates added below those moved up.

Due to unexpected rush jobs, construction delays and weather conditions, adjustments are required from time to time, but by interchanging the strips on the board and moving the thumb tacks the adjustments are quite simple.

Each morning the job supervisors telephone the number of men working. This information is plotted on graphs and can be compared with the schedule at any time, which gives a check upon the estimated man-days shown on the schedule.

•

For Repair of Broken High-Line Conductor

When, if ever, a conductor breaks on the 287-kv. line from Boulder Dam to Los Angeles temporary reconnection will be made with a temporary splice,* quickly applied, developed by the staff of the Los Angeles Bureau of Power and Light. Then, at a convenient time, the line will be de-energized and permanent

* See "Temporary Splice for Transmission Conductor," page 67, ELECTRICAL WORLD, May 20, 1939.

Plenty strong for its light weight is this cable car

Carrying crew aloft

repair made. For this operation, also, locally devised equipment is provided.

A cable car weighing only 151 lb., but strong enough to hold six men with a combined weight of more than 1,200 lb., has been constructed of duralumin. This is designed so that two mechanics can make the permanent splice without lowering the cable to the ground and so that they can work in the air from convenient, natural positions.

The car is lifted into place astride the conductor by means of a steel cable. One end of the cable is securely anchored. From this point it is run through blocks on top of the transmission tower on one side of the break, carried through sheaves of the car to a set of blocks on top of the tower on the other side, and then attached to a power winch.

As slack in the steel cable is taken up, the car, together with its occupants and their line tools, is hoisted higher than the conductor, then lowered over the conductor so that one mechanic is on each side. The car floor is divided for this purpose. Ground crews with hand lines can control lateral movement of the car, if necessary.

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When to Stub or Replace Poles

By BERTRAM E. ELLSWORTH

Electrical Engineer
Iowa-Nebraska Light & Power Company,
Lincoln, Neb.

There is a common belief among a great many operators that it always pays to stub poles rather than to replace them. Other operators never stub poles. This would lead to the belief that both may be partly correct from an economic point of view, although from the standpoint of the scenic appearance of the line there is no argument to present.

If the fixed charges on the total cost of installing a new pole are made equal to the fixed charges of the stub in place, then a curve will be obtained showing the economic balance between the two. Assuming $8\frac{1}{2}$ per cent yearly charges for interest and taxes and 4 per cent for depreciation, the formula on a yearly basis is:

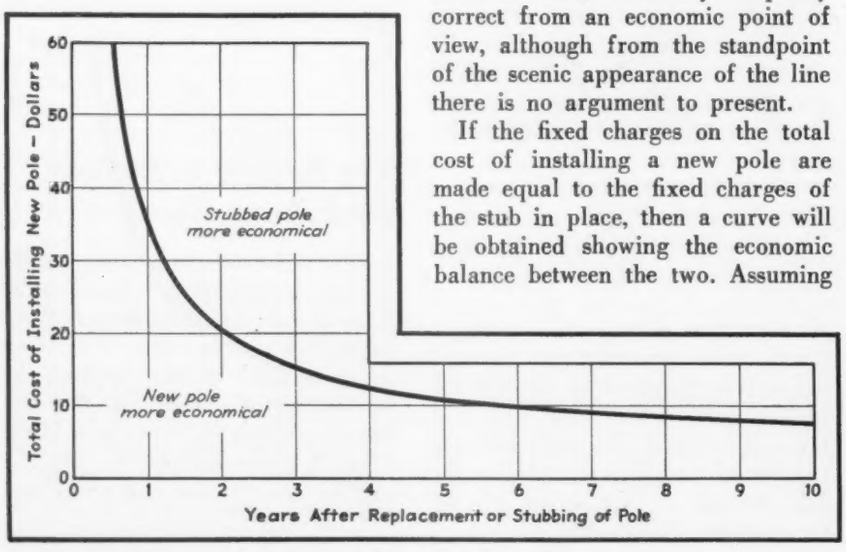
$$0.125\ X = 0.085\ Y + \frac{Y - Z}{N}$$

Where X is the total cost of the new pole installed.
Y is the total cost of the stub installed.
Z is the salvage value of the stub when removed (practically a constant).
N is the number of years the stub is in use.

The accompanying curve is plotted with the total cost of the new pole installed (X) against the number of years the stub must remain in use (N). Cost of the stub (Y) is taken as $6.50 and its salvage value (Z) as $2.50.

For example, if a certain pole can be replaced for $15 the curve shows that the old pole, if stubbed, must remain stubbed longer than three years to make stubbing pay. When a pole is stubbed it is assumed that the top of this pole is sound enough to last the period of years necessary to make stubbing economical.

It will be noted that it rarely pays to stub small or low-cost poles. The cost of the average-sized stub was used in the calculations. To be more exact, the cost of two sizes of stubs could be used, giving two curves, one corresponding to the replacing of small poles and the other curve applying to the larger poles.



Ratio of cost to years of service to fix pole replacements

•

Mobile "Sub" Always on Call

To meet construction or operating emergencies in its state-wide territory the Narragansett Electric Company, Providence, R. I., New England Power Association subsidiary, is constantly prepared to mobilize 500 kva. from a portable substation normally based on its general service station at Melrose. The equipment does away with much expensive duplication of local transformer and switching facilities formerly required in certain areas to maintain satisfactory service during maintenance jobs. While the use of by-pass switches and inter-circuit ties solved the problem so far as feeder equipment was concerned, a more flexible and economical service is assured by this mobile apparatus.

The portable substation can be put in service and the fixed substation

THE SURE SIGN OF A MODERN INDUSTRIAL PLANT

Air Circuit Breakers on All Main and Branch Feeders

He's not afraid. He knows it has plenty of "I C"

"I C" = Interrupting capacity

G-E air circuit breakers are available with interrupting ratings up to 80,000 amperes. You can depend upon getting the specified rating whether the breakers are mounted separately or as factory assembled boards. If you have any question about how to determine the interrupting capacity needed, in order to know the size of circuit breaker to use, get in touch with the nearest G-E office.

THE severity of a short circuit depends largely on the capacity of the transformers that feed the circuits, and it can *not* be determined by the normal load on the circuit. As plant loads have grown, transformer capacities have been materially increased. Therefore, short circuits present an ever-increasing hazard. They seriously endanger personnel and property wherever the power supply has outgrown the interrupting capacity ("I C") of the protective devices.

Are you sure of your "I C"? With G-E air circuit breakers of *known* interrupting capacity, you *can* be sure.

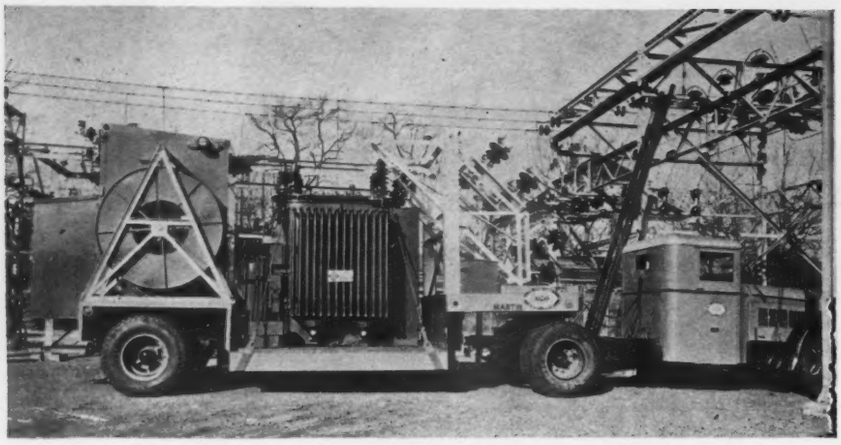
GENERAL ELECTRIC

890-79D

890-86

OF INTEREST TO POWER SALESMEN

This is one of a series of G-E advertisements appearing currently in six industrial trade journals to impress upon electrical engineers and maintenance men the importance of having protective devices with adequate interrupting capacity on their main and branch feeders.



Serves 11 to 33 kv.

The unit, as designed by the Narragansett engineering department and built by the New England Power Service Company, consists of a three-phase, 500-kva. transformer with coils so arranged that primary potentials of 33, 22, 19, 13.8 and 11 kv. can be used. Secondary potentials of 575 volts, 2.3, 4 and 4.6 kv. are obtainable from any of the primary voltages. By using weatherproof fans permanently installed beneath the radiators of the transformer an output of 625 kva. can be had. This is sufficient capacity to carry the off-peak load of most substations served by a single transformer bank.

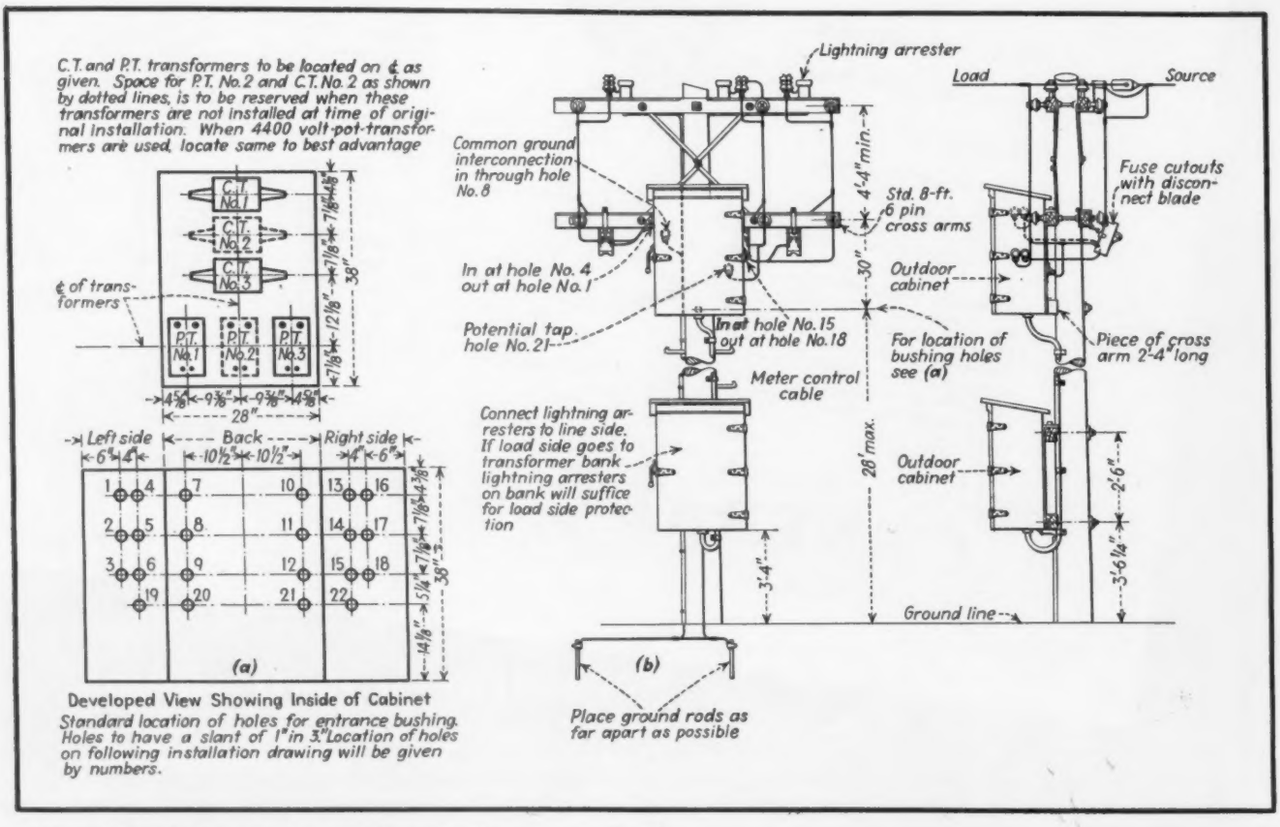
taken out with no interruption when hot line tools are used. The major equipment includes an airbreak switch, high-potential fuses, bus structure, the transformer and portable cable, mounted on a low-gear, two-wheel trailer attached to a 7-ton chassis which was rebuilt for the purpose. For road travel, the over-all height is 11 ft. 5 in., but when ready for service the airbreak switch and fuse holders are raised by a crank to an elevation giving ample clearance from ground for live parts. A 12-volt storage battery mounted on the trailer and charged by the truck generator is used for tripping the oil circuit breaker, serving also for emergency lighting. At the trailer rear is a switch house with instruments and synchronizing equipment.

•

Outdoor Cabinet for Metering Transformers

By developing a standard outdoor cabinet in which indoor metering transformers (2,300-4,400 volts) can be housed outdoors, the American Gas & Electric Company has found that one-third of the cost of conventional outdoor instrument transformers can be saved.

The accompanying diagrams, showing location of instrument transformers and bushing in the cabinet and the method of installation on a pole, are taken from the metering standards of the company. Similar cabinets for housing indoor instrument transformers for 6,900 volts and above have been tried and found unwieldy and expensive. Cost of these cabinets is kept down since they are shop fabricated from special jigs and templets.


C.T. and P.T. transformers to be located on ¢ as given. Space for P.T. No.2 and C.T. No.2 as shown by dotted lines, is to be reserved when these transformers are not installed at time of original installation. When 4400 volt-pot-transformers are used, locate same to best advantage
C.T. No.1
C.T. No.2
C.T. No.3
¢ of transformers
P.T. No.1
P.T. No.2
P.T. No.3
28"
Left side
Back
Right side
(a)
Developed View Showing Inside of Cabinet
Standard location of holes for entrance bushing. Holes to have a slant of 1" in 3". Location of holes on following installation drawing will be given by numbers.
Lightning arrester
Load
Source
Common ground interconnection in through hole No. 8
4'-4" min.
Std. 8-ft. 6 pin cross arms
Fuse cutouts with disconnect blade
In at hole No. 4 out at hole No. 1
30"
Outdoor cabinet
Potential tap hole No. 21
In at hole No. 15 out at hole No. 18
For location of bushing holes see (a)
Piece of cross arm 2'-4" long
Meter control cable
Connect lightning arresters to line side. If load side goes to transformer bank lightning arresters on bank will suffice for load side protection
28' max.
Outdoor cabinet
2'-6"
3'-6 1/4"
3'-4"
Ground line
(b)
Place ground rods as far apart as possible

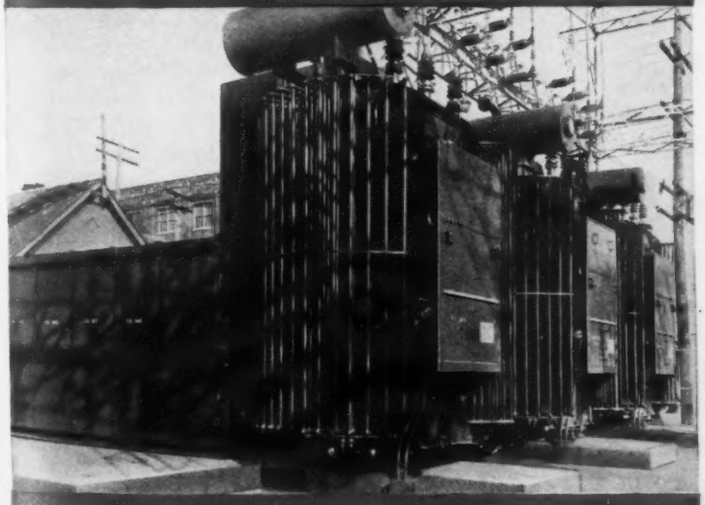
Cabinets house indoor metering transformers outdoors

(a) Location of instrument transformers and bushings in cabinet. (b) Arrangement of box on standard metering pole, 2,300 and 4,000-volt, three-wire

See how these large unit substations go into service

1. They arrive—each in two major parts

2. They're set on solid foundations, equipped with accessories, connected . . .



3. And here they are—at work

YES, even the big ones—like these three 6000/8000-kva units for the Indianapolis Power and Light Company—offer advantages in installation. Compared with conventional substations, these factory-built units have far fewer parts requiring field assembly. Consequently, they can be installed in less time and with less work.

Yet ease of installation is but one of several important reasons for specifying unit substations. And any *one* reason might justify their selection.

Besides installation savings, these units offer an important advantage in case the load center changes—they can be moved readily to a new location. Because of their compactness, they require less space, which means savings in real estate, too.

Furthermore, they are neat in appearance—in fact, one power company recently used pictures of actual installations to convince property owners that a proposed installation would be an asset to the neighborhood.

All in all, the unit-substation way is the *modern* way. For that next area to be served, try a G-E unit substation and experience the satisfaction that dozens of users are enjoying. For further information, call the nearest G-E sales office or write General Electric Company, Schenectady, New York.

GENERAL ELECTRIC

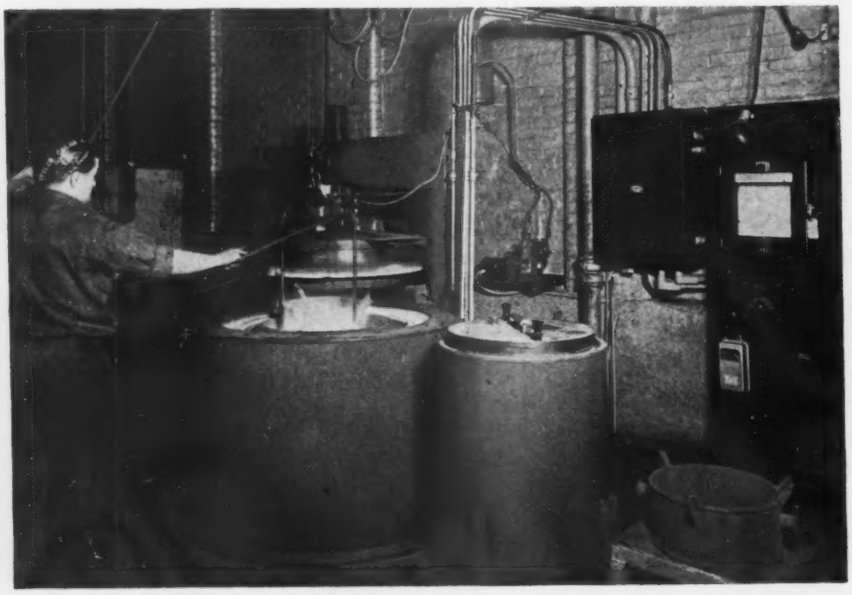
310-35

INDUSTRIAL ENGINEERING

Modern Furnace Increases Production

Carburizing operations at the plant of the Royal Typewriter Company, Hartford, Conn., have been speeded up at least 25 per cent by the recent installation of a 30-kw. Leeds & Northrup "Homocarb" electric furnace, superseding a former box type layout in which two 60-kw. units handled the work. The process time has been cut from eight hours to six hours on the longer heats required by heavy parts, largely on account of the fact that the new equipment requires no compound or pot heating. The new furnace uses a special hydrocarbon provided by the furnace manufacturer, which is introduced into the heated load by a fuel engine type injection pump, the rate of flow of the fluid being accurately controlled. No packing of the work is necessary. Parts are introduced into the furnace bare, in open baskets, so that the furnace operates almost as simply as a hardening furnace. Forced convection by a motor-driven fan provides uniform heating throughout even closely assembled loads. Operating temperatures range between 1,500 and 1,650 deg. F., depending on the work, and some heats run as short a time as 1.5 hours. In general as much work is done now with one heat as used to be handled in three heats with the box type furnace.

Using 0.5 pt. of fluid per hour, applied when the load becomes equalized, the parts are loaded in trays weighing 40 lb. each. A typical instance of economical handling is afforded by ball races. With the "Homocarb" the weight of one tray loaded was 203 lb., making the weight of parts in one tray 163 lb. There were 1,513 pieces in one tray. With an operating load of three trays, the weight of parts was 489 lb.; total weight 609 lb., and number of pieces 4,539. By the old box furnace method, in which the races were packed in pots, the weight of the pot was 53 lb., of the cover 18 lb., of the packed pot 123 lb., of the compound 30 lb., of the parts themselves 16.75 lb., and the number of pieces 158. Ten pots were placed in one box type furnace, so that the resulting weights were 300 lb. of compound, 167.5 lb. for the pots, and a total of 1,580 pieces, weighing all together 1,277.5 lb.



Energy requirements cut by carburizing furnace

•

Centralized Test Sets in Machine Tool Plant

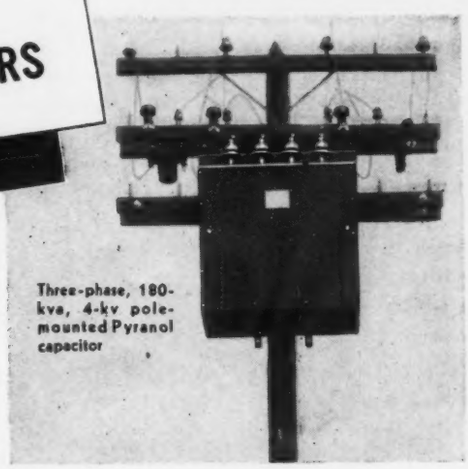
By bringing three motor-generator testing sets into a central location adjacent to the plant air compressor, mounting, starting and control equipment in close proximity, and leaving the space in front of the units free, the Blanchard Machine Company, Cambridge, Mass., eliminated the former disadvantages of having these units in three separate buildings, besides doing away with a more extended belt drive.

The compressor, a 7x7-in. Ingersoll-Rand outfit, was formerly located in the basement. By equipping it with a short guarded belt drive in its new location space was saved, and the use of a 10-hp. S. A. Woods Machine Company (Boston) 550-volt induction motor with Rockwood drive enables the weight of the motor to maintain belt tension, the speeds of the motor and compressor pulleys being respectively 1,200 and 300 r.p.m.

The motor-generator sets for testing consist of a 50-hp. General Electric and a 25-hp. Westinghouse layout, the drives being by 550-volt

They Got Feeder Capacity for $7 per kw Instead of $21.50

HOW A MISSOURI UTILITY PROFITED BY USING DISTRIBUTION CAPACITORS



Three-phase, 180-kva, 4-kv pole-mounted Pyranol capacitor

FOUR years ago the Union Electric Company of St. Louis needed a substantial increase in capacity on one of its feeders to meet the anticipated winter peak loads of 1935-36.

One way to obtain this capacity was to install a new feeder—capacity 1500 kw—costing $21.50 per kw. Instead, the power company engineers worked out a method of increasing the load-handling ability of their overhead distribution circuits by applying shunt capacitors arranged for pole mounting. This method of approach enabled the company to get the capacity it required at much lower cost than that of building a new circuit. They installed two 180-kva pole-type equipments and released 500 kw of capacity at a cost of $7 per kw by improving power-factor on the existing circuits.

Inasmuch as 500 kw of capacity was calculated to be adequate for all requirements during the near future, the larger investment in the new feeder would have been largely for excess capacity—another factor favoring the use of capacitors. This company has found this method of increasing system capacity so satisfactory that today it has installed over 16,000 kva in this type of equipment.

The Service Record of G-E Pyranol Capacitors

Today, after G-E Pyranol capacitors have been in service nearly four years, the Union Electric Company reports the following experience with these units:

1. After capacitors were installed, the peak loads handled by the feeder were 25 per cent greater than could otherwise have been handled successfully.

2. The installation immediately reduced voltage drop on the feeder from 7.8 volts maximum to 4.6 volts maximum, allowing a margin for increased load.

3. The capacitors have operated continuously, without requiring maintenance of any kind.

4. Because one year's carrying charges on the forestalled investment in a new feeder were sufficient to pay the total installed cost of the capacitors, the capacitors can be said to have paid for themselves each year since they were installed. Savings in line losses have bettered even this performance.

Savings for You

Overloaded substations and feeders on your system offer opportunities to release capacity at a saving with G-E Pyranol capacitors. You will find that improved voltage conditions and reduced losses are extra benefits that usually follow the installation of capacitors. Ask your G-E representative for complete information or write for GEA-2746, "Pyranol Capacitors for Central Station Applications." Address General Electric Company, Schenectady, New York.

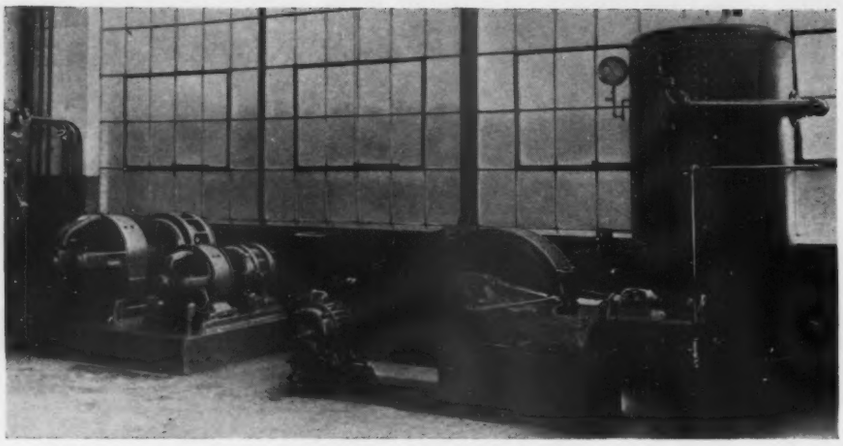
COMPARING THE COSTS

New Feeder		Distribution Capacitors	
Circuit	$10,800	Capacitor cost (installed)	$3500
Feeder position	13,500		
Allocation of Duct Space	8,000		
Total	$32,300		
Capacity obtained	1500 kw	Capacity released	500 kw
Investment per kw	$21.50	Investment per kw	$7

Note—that the carrying charges on the out-of-pocket investment for a new feeder, $24,300 (i. e., $32,300—$8,000) at 15 per cent, would have been $3645 per year, or more than the cost of the capacitors completely installed.

GENERAL ELECTRIC

360-147



Motor-generator sets and air compressor in plant center contribute to economical operation

a.c. motors and the generators 220 volts d.c. for machine tool motor-drive tests. A 3-hp. set at the rear delivers 110-volt d.c. energy for testing. A switchboard at the left furnishes facilities for instrumental readings, with test circuit controls.

In the new location these units serve the present plant and are so related to future extensions that minimum investment in wiring and minimum energy losses in testing are assured. Setting up and testing are simplified, the chance of shutdowns is diminished by the concentration of facilities at one supervised point and economical use of energy is made more certain.

•

Remedy Electrolysis in Plant Water Main

By F. M. CARVER
Maintenance Foreman
Reliance Electric & Engineering Company,
Cleveland, Ohio

Due to the presence of stray electrolytic currents and soil of a corrosive chemical nature, several sections of an 8-in. plain cast-iron water main of the Reliance Electric & Engineering Company developed severely corroded pits in their surface and eventually leaked to the extent that the sections had to be replaced.

The soil about the pipe was wet, indicating poor drainage conditions, and varied from dark-colored clay to black muck. It was examined by a chemist and found to be distinctly alkaline. Tests for stray electrolytic currents revealed potential differences in the soil of as much as 50 millivolts.

Although only a few sections were affected, it was evident, because of similar unfavorable soil conditions all along the main, that leakage might be expected at other points unless all the pipe sections were treated.

To remedy these conditions, it was decided to remove all the soil within at least 1½ ft. of the pipe which lay from 4 to 8 feet underground. To reduce electrolytic action the pipe sections were then electrically connected by a bare No. 6 copper wire running the entire length of the main. This wire was attached to each section with ground clamps and, as a further precaution, carefully grounded again at both ends of the water line.

Treatment of the pipe surface was not overlooked. It was first painted with hot asphalt, then wrapped with asphalt-impregnated paper and painted again with more hot asphalt.

Of equally great importance, the soil which had immediately surrounded the water main was not put back. Instead, it was replaced with a dry sand loam, secured from a different locality.

All of the foregoing work called, of course, for a certain amount of excavation. However, instead of digging a continuous, open trench through the working area of the plant, interference with manufacturing operations was held to a minimum by breaking holes in the concrete floor only at 15 to 20 ft. intervals and tunneling around the pipe which lay between these points.

Faster Motor Assembly With High-Frequency Tools

High-frequency tools used on the Diesel and tractor engine assembly of the Caterpillar Tractor Company, Peoria, Ill., not only speed up assembly operations but, since they operate at 180 cycles, instead of 60 cycles, they weigh about half as much as lower-frequency power tools. About 36 tools suspended from an overhead power trolley are used on the 200-ft. long assembly line. The tools are supplied at 220 volts from a 40-hp. frequency-changer set mounted as shown on a steel column and controlled from the floor. Although the connected load on the frequency changer exceeds the capacity of the set, all 36 of the tools are never in use at once. To serve the connected load of 65 hp. represented by the 36 tools a much larger frequency-changer set would have been required.

Street lighting COSTS LESS when you use G-E Form 79 Luminaires

Here's Why

80 PER CENT LESS GLASS BREAKAGE

Breakage on the tens of thousands of Form 79 luminaires in service (including 15,000 in New York City) is 80 per cent less than on fixtures not equipped with the spun-on globe. Figures are open for inspection.

SPUN-ON GLOBE KEEPS LUMINAIRES CLEAN, REDUCES MAINTENANCE

Form 79 luminaires in service for years have been inspected and found free of internal dirt. This is an important aid to efficiency and eliminates expensive cleaning operations necessary on luminaires which admit insects and dirt. "I've relamped Form 79 luminaires for three years," says one utility service man, "and I've never seen dirt on the inside."

MANY thousands of units in service have proved that the Form 79 will operate at lower expense and higher efficiency than fixtures not equipped with the spun-on globe. The widespread confidence of operating companies in the Form 79 is shown by their extensive use of it in modernizing and extending street-lighting systems.

Examine the Form 79 yourself. Notice the stepped reflector, which redirects heat rays around the lamp filament, resulting in better lamp performance. Observe the new die-cast aluminum hood, standard on all Form 79's for both vertical and slip-fitter mounting. It is dust-tight with either internal or external wiring, and is used interchangeably with either radial-wave or enclosed reflectors. Look especially at the spun-on globe, secret of the Form 79's low maintenance record.

Then try Form 79 luminaires for your next installation. Compare globe replacement and other maintenance costs with those of other fixtures. See for yourself how you can save with the G-E Form 79. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

500-343

NEW ENGINEERING IDEAS

Improved Insulation With New Material--II*

By S. L. BROUS
B. F. Goodrich Company, Akron, Ohio

For service where oil or corrosives are deteriorating agents for common insulating materials "Koroseal" is adaptable for use as an insulation for wiring apparatus and machinery and in light and power service as an insulation for switchboard and station control cable. Likewise for railroad services, such as in signal apparatus and control stations and towers.

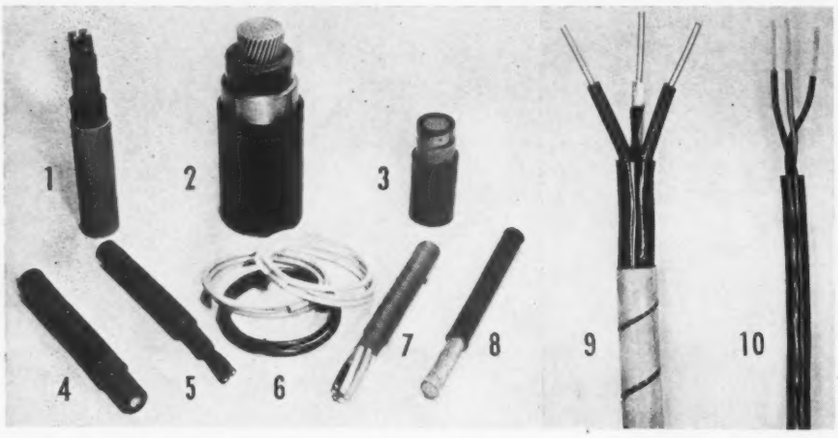
Since the over-all diameter of "Koroseal" insulated wire can be materially decreased without decreasing the load-carrying capacity of the conductor, the material offers interest for building wire either as the insulation or as a sheathing over other insulation.

This latter application is particularly important, since in many old buildings new wiring is required to carry the heavier loads of modernized lighting systems. With the new type of insulation four No. 10 conductors can be pulled easily into the old conduits formerly housing four No. 14 conductors.

Considerable corrosion of lead resulting from induced currents in sheaths over heavy conductors is frequently observed in power station work. A "Koroseal" sheath over the lead eliminates such corrosion.

Exhaustive testing has indicated the merits of "Koroseal" as a replacement for lead as the sheathing material over varnished cambric insulated cables for both underground and aerial installations. Such replacement permits the use of substantially lighter weight cables and simplifies installation problems. A similar application to paper-insulated cables is being studied.

* This is the second of two articles describing the properties and application of "Koroseal." See ELECTRICAL WORLD, May 20, 1939, page 76.



"Koroseal" combines protection with improved insulation for different kinds of cable

(1) Control cable; Koroseal insulation; Koroseal sheath with flame-proof braid protection; provides durable insulation and mechanical protection for hot locations. (2) Generator lead; varnished cambric insulation; lead sheath with Koroseal cover protection; protects lead from corrosion and electrolysis. (3) High-voltage power cable; oil-impregnated paper with shielding tape; Koroseal sheath; supplants lead to eliminate trouble from corrosion, electrolysis and vibration. (4) Power cable; improved high-voltage composition; Koroseal jacket; provides complete moisture, chemical and oil resistance, also prevents sun checking. (5) Control cable; felted asbestos; Koroseal jacket; combines moisture resistance with non-combustibility. (6) Switchboard or building wire; Koroseal insulation and mechanical protection in single covering; eliminates bulky braids and provides moisture and flame resistance. (7) Control cable; Koroseal in colors; flame-proof braid; identifies conductors and provides resistance to oil, flame and moisture. (8) Super-flexible battery lead; Koroseal insulation and mechanical protection in single covering; resists abrasion and attack by acid for long periods. (9) Oil well pump lead; Koroseal; Koroseal jacket, steel-taped armor; provides durable insulation and jacket for severe service obtained in oil wells. (10) Rayon spinning motor lead; Koroseal; Koroseal jacket; provides resistance to lubricating oil and sulphuric acid. Photographs of cable (1) through (8) courtesy the Okonite Company; of cables (9) and (10) courtesy General Electric Co.

•

Boiler Gives Steam in Fifteen Seconds

A 1,500-watt resistance coil, a porcelain core and a glass container make up this steam generator which will change ordinary tap water into 350-deg. F. steam in fifteen seconds. Connected with a water supply, automatically kept half filled with water and plugged into a 110-volt electric outlet, the device will convert five pints of water into live steam an hour.

Developed in the lamp division of Westinghouse Electric & Manufacturing Company as an aid to quick sterilizing, the heater, known as "Type WL-740," is seen to have application as a still, to keep restaurant steam tables hot, and for other home, commercial and indus-

A G-E Portable Instrument FOR AS LITTLE AS $27

HIGHLY ACCURATE — **DEPENDABLE — CONVENIENT**

A-c or D-c

GET THE BENEFITS OF A GENERAL ELECTRIC TESTING SET

YES, it's true—you can start your testing set right now for as little as $27, the net price of a General Electric AP-9 (a-c) voltmeter.

Moreover, you will find its accuracy and dependability typical of the entire line of G-E portables—standard-, miniature-, and medium-size, a-c or d-c—a line which has helped establish General Electric as "Headquarters for Electrical Measurement."

Nowadays, when even small errors may result in reduced efficiency and needless losses of profit, you can really benefit from the high accuracy of these portables. And their record of reliability is testimony as to their sturdy construction, durable parts, sound engineering design. They fulfill the requirements of factory maintenance today.

For more information on why your next testing instruments should be G-E, call the nearest G-E office or write for Bulletin GEA-1784. General Electric, Schenectady, N. Y.

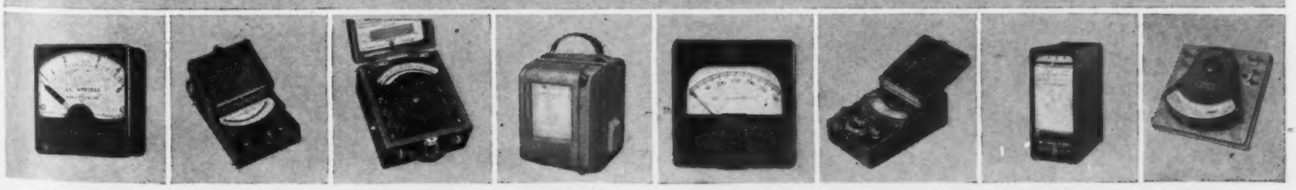
NO GUESSWORK HERE

The man with an instrument can find out where he can increase plant efficiency.

Using instruments for voltage check-ups, and for locating weak spots in electrical systems and power leaks that eat up profits, he can obtain facts about operation.

He can detect unreliable, overloaded motors or inefficient, underloaded motors quickly and easily. And by correcting these conditions, he can reduce maintenance costs and power-factor penalties.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT



Rectangular switchboard | Medium-size portable | High-accuracy portable | Inkless recorder | Small panel | Pocket portable | Recording | Laboratory standard

GENERAL ELECTRIC

Midget steam boiler

trial uses where only a small amount of steam at atmospheric pressure is required.

•

Alnico Magnets Used in Compact Instrument

By H. T. FAUS and A. J. CORSON

General Electric Company,
West Lynn, Mass.*

Careful consideration of the properties of aluminum-nickel-cobalt alloys (high coercive force and available energy) as a permanent magnet material has evolved a compact design of d.c. measuring instrument characterized by inherent self-shielding and high gap flux density. These characteristics make possible instruments of small size having sustained accuracy and high sensitivity.

An alloy of approximately 10 per cent aluminum, 17 per cent nickel, 13 per cent cobalt and 6 per cent copper, with the remainder iron, termed "Alnico II," was used for the magnet. Sector-shaped magnets of this material proved practicable for obtaining a magnet which would have a flux path of uniform length and uniform flux density.

While uniform flux distribution may be obtained without using soft-iron pole pieces on magnets of this shape, it is advisable to use thin pole pieces attached to the face of the magnet, since there may be slight fissures in the magnet material and also because it is found difficult to magnetize these magnets in a perfectly radial manner.

In applying the design it was found that true sector shapes were unnecessary. First, the increase in leakage flux with departure from the center of the system is not as great as the increase in magnet section, and, second, the outer corners of the sector are partially ineffective due to difficulties in magnetization. As a consequence these corners were cut back without appreciable loss in flux.

The constants for the magnetic circuit of a concentric magnet millivoltmeter of this material follow:

Total magnet length (2 sections), cm...	3.02
Maximum magnet area (at ring), square cm.	9.1
Minimum effective magnet area (at gap), square cm.	4.4
Total magnet flux (saturated), maxwells.	23,600
Leakage flux (saturated), maxwells.....	12,000
Air-gap flux (saturated), maxwells.....	11,600
Air-gap flux density (a) saturated, gausses	2,900
(b) after stabilization, gausses.....	2,600
Torque per ampere-turn, millimeter-grams.	10

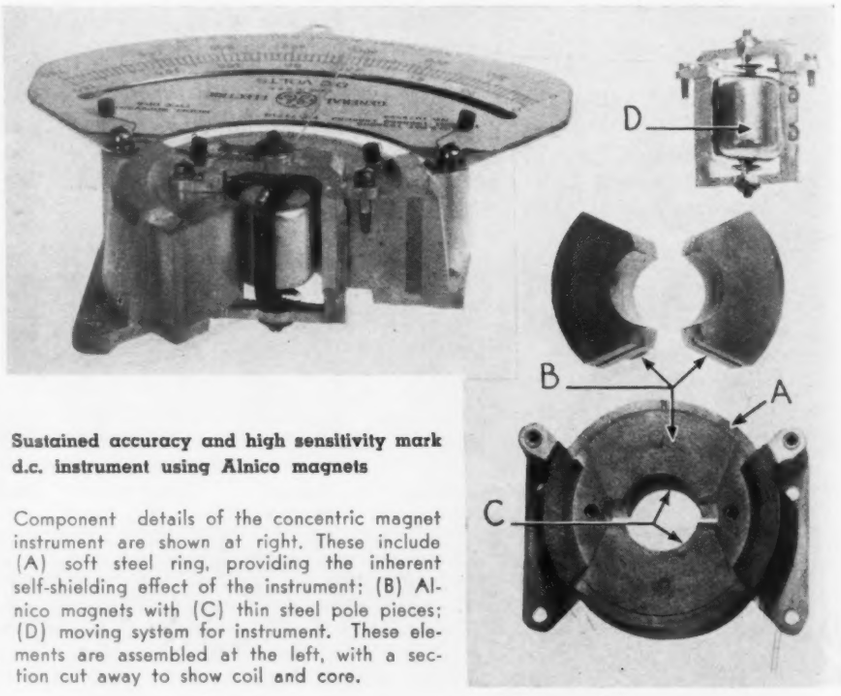
Note—While a leakage of about one-half the total flux seems high, it should be remembered that the leakage flux is taken care of by taper in the magnet section, hence does not subtract from the effectiveness of the design. So far as the authors' experience has extended, a useful air-gap flux density of 2,600 gausses in indicating instruments has been equaled only by using cobalt-steel magnets of very liberal proportions.

The design of a moving system for use with the concentric Alnico magnets does not differ in principle from conventional constructions, the general objective being a maximum technical factor of merit and speed of response at a definite current value. For the instrument described above, a millivoltmeter having an accuracy rating of ½ per cent of full-scale reading, the figure of merit of 1.54 was obtained and the response time was 0.95 second.

It was necessary, however, to give special consideration to the means of providing damping torque in this instrument. Various values of torque were required for different applications, depending on the actuating torque and resistance of the circuit in which the instrument was to be used, and this necessitated a flexible means of obtaining various damping constants. The conventional aluminum frame was found to be inapplicable in a majority of ratings because, in combination with the high gap flux density, over-damping resulted, even when the thickness of the frame was reduced to a minimum. The desired result was obtained by the use of damper windings of turns and resistance determined by the characteristics of the instrument involved. Considering again the above-described instrument, a damping factor of 32, corresponding to a decrement of 0.03, was obtained.

Performance data for the concentric magnet instruments follow:

Frictional error (difference between ascending and descending scale readings) per cent (full-scale)	0.1
Ambient temperature coefficient in per cent per deg. C.	
(a) Of magnet	—0.013
(b) Of control springs	+0.036
(c) Of circuit	—0.046
(d) Of instrument	—0.023
Instantaneous overload—load which may be applied for one second without causing mechanical damage	60 times normal load
Error due to stray fields	
(a) 20-gauss field, temporary error, per cent	2.1
(b) Permanent error, per cent	0.1
Magnet stability—per cent change due to normal aging, conditions similar to instrument application for period of 18 months	
(a) 5 magnets—maximum change	—0.15
5 magnets—minimum change	—0.0
5 magnets—average change	—0.07



Sustained accuracy and high sensitivity mark d.c. instrument using Alnico magnets

Component details of the concentric magnet instrument are shown at right. These include (A) soft steel ring, providing the inherent self-shielding effect of the instrument; (B) Alnico magnets with (C) thin steel pole pieces; (D) moving system for instrument. These elements are assembled at the left, with a section cut away to show coil and core.

*Adapted from a paper presented at the A.I.E.E. Northeastern District meeting, Springfield, Mass., May 3-5, 1939.

New Electric Process for Carbonizing Coal

An electric carbonizing process makes coke, gas and oil from coal with many advantages over the present by-product coke process. A paper by H. Stevens before the Electrochemical Society gives details of the process and a diagram of the 30-ton retort used in the Delray plant of the Detroit Edison Company.

Coal is placed in a cylindrical retort and heated electrically. Electricity flows through a starting core of conducting pipe filled with coke and gradually heats the coal from the center outward, making gas, coke and oil which is readily recovered. As the coal turns to coke the current automatically follows the adjacent fused mass lying toward the circumference of the cylinder because of changes in resistance of the path.

By-Product Gas Is Lighter

Gas and oily vapors pass over cold coal and are thereby scrubbed and cooled before leaving the retort. The oil is drained from the bottom. The hot coke is taken from the bottom of the retort into a conveyor, where it is quenched and loaded into cars. Gas from the retort weighs only 248 lb. per 10,000 cu.ft., as compared to 337 lb. per 10,000 cu.ft. for the usual by-product process. The excess weight of the by-product gas comes from the non-combustible constituents. One ton of coal produces 10,000 cu.ft. of gas of 530 B.t.u. per cu.ft. in the electric retort. Tar recovered is 12 to 27 gal. per ton, as compared to 9 gal. for the by-product process.

Current is supplied to the 30-ton retort through a single-phase, 60-cycle, 850-kva. tap-changing transformer. Starting and finishing voltage ranges from 400 down to 75. Power factor averages 85 per cent. It requires about 350 kw.-hr. per ton of moist coal and this consumption can be reduced considerably under commercial conditions.

Since the electrical process is flexible it is proposed to use it for off-peak operations from utility systems to make coke for use in house heating. This new process has a thermal efficiency of better than 95 per cent and every ton of coal carbonized by the process yields more and better products than heretofore has been possible.

THIS APPROVED METHOD GIVES *YOU* SAFER FASTER POLE UNLOADING

• *View of Car braced with Acme Unit-Load Bands*

The Acme Unit-Load Method of bracing cars of poles for shipment has been approved by the Loading Rules Committee of the A.A.R. And because it enables safer, faster, more economical *unloading* it is preferred by more and more pole receivers in all parts of the country.

The low-cost, Unit Load Method, developed by Acme, is simple and easy to apply. The flat Acme Bands are placed around the load and across the stakes then tensioned and sealed. The danger of damage, delay or loss in transit is eliminated.

The procedures suggested for safer, faster and more economical unloading are contained in the illustrated booklet—"Pole Shipments and Unloading Procedures"—a copy should be in your files for ready reference. Write for it today—it may be the means of helping you increase safety—decrease costs.

• *Showing how safely and easily bands are removed from side opposite unloading side.*

• *Tension is gradually eased and poles roll safely off the Car.*

ACME STEEL COMPANY
2845 ARCHER AVENUE
CHICAGO, ILL.

Branches and Sales Offices in Principal Cities

ACME STEEL COMPANY,
2845 Archer Ave., Chicago, Ill.
Send me a copy of the booklet about POLE SHIPMENT with suggested *safe* Unloading Procedures.

Name .....
Address .....
City ..... State .....

LOAD BUILDING

Electric Cooking Saves $1,100 in School Year

By S. S. SANSBURY
Sales Engineer
Union Electric Company of Missouri, St. Louis

While it is generally recognized that electric cookery in institutions provides savings in food costs and improvement in food quality, little accurate information has been available as to the amount of these savings in specific installations. However, in the case of Western Military Academy at Alton, Ill., where electric kitchen and bakeshop equipment were installed in 1937, replacing coal-fired equipment, carefully maintained records showed a net saving per meal of 0.55 cent for approximately 200,000 meals.

The electric equipment installed at the academy totals 69 kw. and consists of

1	4-ft. range	22 kw.
1	3-ft. range	17.6 kw.
2	30-lb. fry kettles	9 kw.
2	vertical broilers	12 kw.
1	4-pan bake oven	8.4 kw.

During the school term from September to June, 1937-38, a total of 199,563 meals were served to a student body averaging 204 and a staff personnel of 60. Total cost of electricity for the previous term amounted to $2,875, whereas with the complete electric kitchen and bakery total cost of electricity amounted to $3,383, a net increase of $508, about half of which was directly attributed to electricity in the kitchen.

Referring only to the cost of fuel, electric cooking saved about $300. By taking into consideration the saving in meat shrinkage, food spoilage, fat saving, savings in soap, hot water and cleaning compound, it is estimated by the school authorities that during the first school term in which electric cooking was used a saving of about $800, or 2.5 per cent of total food cost, was realized.

During the school year prior to the installation the academy used 60,010 kw.-hr. With the electric kitchen and bakery the institution used 106,100 kw.-hr., an increase of 46,090 kw.-hr. Assuming the total increase in energy use was due to electric cooking and baking, and analyzing the above figures, several facts appear evident:

Meals prepared	200,000
Energy use for cooking per meal, watt-hours	230
Cost of energy for cooking per meal	1/4¢
Fuel cost saving	$300
Food cost saving	$800
Total net saving (after allowing for cost of electricity for cooking)	$1,100
Net saving per meal	0.55¢

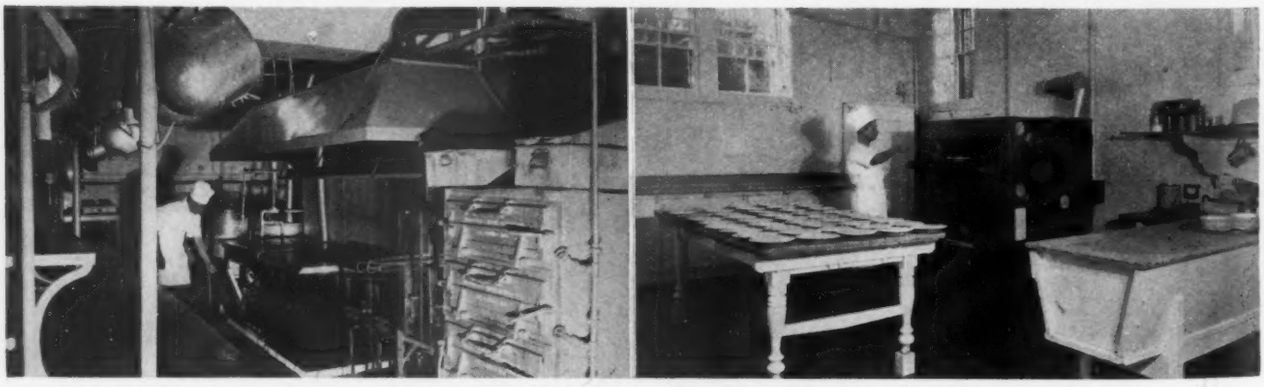
•

San Joaquin Goal $1,363,000 in Wiring

By S. W. GREEN
Advertising Department,
San Joaquin Power Division,
Pacific Gas & Electric Company, Fresno, Cal.

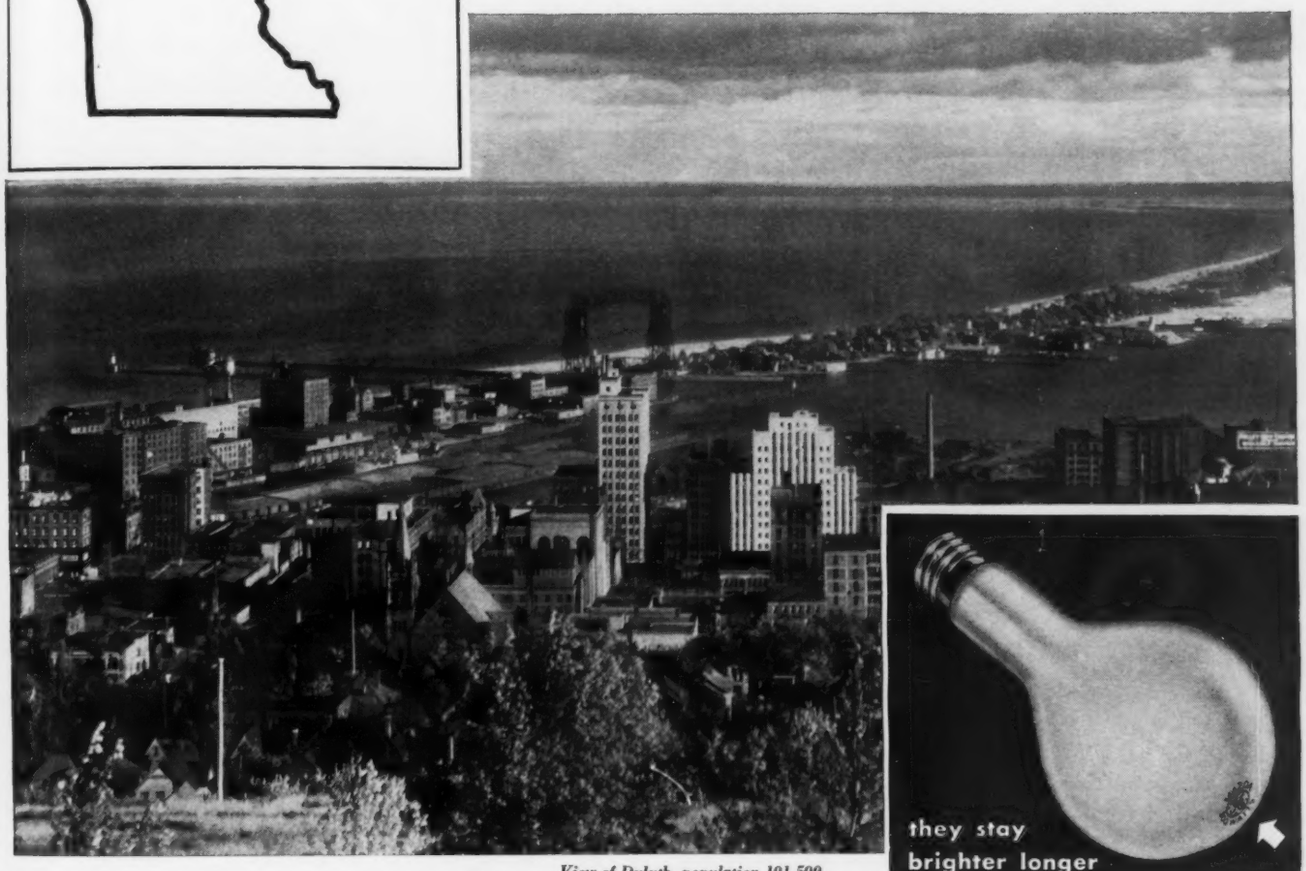
In January meetings were held in various parts of our territory with dealers' salesmen and contact employees to present the advertising program for 1939. The first department to be presented at these meetings was that of adequate wiring. A study of the need for adequate wiring in each section of the territory was presented and the total market for the entire year was estimated at $1,363,000.

A system-wide program included six large pieces of copy featuring adequate wiring and a small plug



Electric kitchen and bakeshop save $1,100 per school term for boys' school
Left—Electric kitchen with two ranges, two fry kettles and four vertical broilers. Right—Bakeshop with four-pan electric bakeoven

Selling lamps and lighting in DULUTH, MINN.



View of Duluth, population 101,500

IN YOUR CITY. You can easily estimate the approximate number of lamp and lighting advertisements General Electric is delivering to your customers by applying the following national averages:

Going into the average wired home in 1939

14 magazines with G-E lamp ads
5 newspapers with G-E lamp ads
5 radio messages
24 total advertising messages

• • •

In the last 10 years, the average wired home received

158 magazines with G-E lamp ads
30 newspapers with G-E lamp ads
20 radio messages
208 total advertising messages

HERE'S a brief review of the way General Electric advertising is constantly at work in Duluth, promoting light-conditioning for Better Light-Better Sight. Into Duluth homes every week goes a steady stream of G-E lamp and lighting advertisements amounting to approximately 48 impressions per person in the last ten years.

IN 1939 . . . 390,000 magazines with G-E lamp advertisements and 131,500 radio messages.

SINCE 1929 . . . 4,115,000 magazines with G-E lamp advertisements.

FALL 1938 . . . 139,000 copies of Duluth newspapers with G-E lamp advertisements.

LAST TEN YEARS . . . 4,921,000 advertisements in magazines, newspapers, and radio. Which is approximately 48 advertisements per capita.

G-E MAZDA LAMPS

GENERAL ELECTRIC

to be used in other copy on appliances, refrigeration, lighting, air conditioning and some agricultural power. Adequate wiring also was featured in small copy in miscellaneous weeklies and other publications. The adequate wiring survey was presented by a company illuminating engineer, specializing in wiring layouts, and by our division sales manager to all contractors to maintain high standards for the benefits that would accrue to all in the industry as well as greater satisfaction to the customer.

Wiring is co-ordinated with merchandising through merchandising salesmen and a kitchen layout department is a new feature of the merchandising division.

Our contractor-dealers were so busy during the last quarter of the past year that promotion plans had to be held up, but they have since been resumed. An encouraging feature is the wholehearted support given the adequate wiring program by all electrical inspectors in our territory.

•

Cleveland Ranges for One Home in Six

Since the Home Bureau of the Electrical League in Cleveland started, two years ago, the ratio of electric ranges installed in new homes has improved from one to ninety to one in six. This bureau works with architects and builders and arouses interest in the building field by means of range demonstrations which are held once a week.

Builders and architects and their wives are invited to watch three types of meals being cooked on an electric range. They listen to an informal talk on electric cookery and then partake of the cooked foods. Groups are limited to seven or eight couples per meeting.

At 23 meetings held during 1938 43 builders subsequently bought electric ranges for their own use, and in addition they have installed 207 electric ranges in new buildings which they have constructed.

•

Utility Showroom With 48 Kw. of Light

By CHARLES GALLO
Lighting Department,
Public Service Electric & Gas Company,
Newark, N. J.

Public Service Electric & Gas Company in New Jersey has been remodeling the lighting in a number of its commercial offices, bringing illumination levels to 30-40 ft.-candles by the use of combination mercury-incandescent indirect lighting in showrooms and incandescent indirect lighting in the offices. The program was undertaken to bolster intensities and the quality of light in accordance with modern standards, and to set an example in modern lighting design for the general merchants.

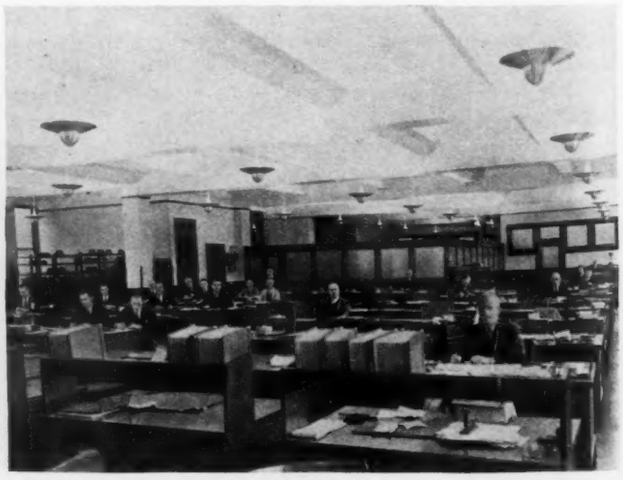
The company's commercial offices at Jersey City and Hackensack are the most recent to be relighted. At these showrooms 2,400 watts per fixture is used. Each fixture houses one 400-watt, high-intensity mercury-vapor unit (16,000 lumens output) and four 500-watt, incandescent lamps (40,000 lumens). This arrangement yields the desired illumination range with an average wattage density of 6 watts per sq.ft. in the Jersey City showroom and 7 watts per sq.ft. at the Hackensack showroom.

Details of Installation

At Jersey City the showroom is 42 ft. wide, 190 ft. long and has a ceiling height of 17 ft. Units are mounted on 18 x 20-ft. centers with the rim of the special fixtures 11 ft. from the floor. Twenty fixtures are used. Although the old fixtures were installed between beams, the new luminaires were suspended from a metal wiring trough which was added to the under side of the beam. Mounting the fixtures in this manner made it unnecessary to tear up the floor of the bookkeeping department overhead.

Typical of the lighting in large offices on other floors of the Jersey City building is that in the bookkeeping department. This department occupies a room 101 ft. long and from 41 to 58 ft. wide. Here 30 ft.-candles is provided by 1,000-watt lamps in indirect fixtures suspended 42 in. from the 13-ft. ceiling and mounted on approximately 14-ft. centers. Twenty-nine fixtures are used. Typical of the treatment of smaller offices is a 20 x 23-ft. room in which four 1,000-watt indirect fixtures are used.

Twenty special combination luminaires totaling 48 kw. provide 30 to 35 ft.-candles in utility showroom



Incandescent lighting of 30 ft.-candles is provided in bookkeeping department

Only half the showroom is shown. Note use of contrasting paint on metal wiring ducts to break up ceiling lines. White paint with extremely slight green tint was used on ceiling.

Just Follow the Kelvinator Sales Production Line...

ENDS "HIT-OR-MISS" SELLING *OF COMMERCIAL EQUIPMENT*

Again Kelvinator works with Utilities to develop a "Dollars-and-Cents" Sales Approach to the Commercial Market

PROBABLY no field of load expansion looks as promising today as commercial equipment for stores, restaurants, institutions, offices and manufacturing establishments.

It's equally true that no other field has so many unknown factors . . . as to *who* are prospects, *where* they are, *how* they can be sold, and at *what profit.*

But—have you heard about the Kelvinator Production Line Plan of Selling?

Here is a Plan you can follow with slide-rule certainty . . . or recommend to the Kelvinator dealer with whom you are cooperating in the building of load . . . a plan that develops sales and profits as smoothly as the Kelvinator production line turns out Commercial Equipment, including Commercial Refrigeration, Beverage and Water Coolers, Air Conditioning and Automatic Heating Equipment.

With a remarkable degree of accuracy, a Kelvinator man can sit down with a utility official or a distributor, and estimate potential sales in a given area, the man power needed, the approximate selling cost, and even the results that can be expected based on national average performance.

No theorizing, no "magic", but actual performance records of hundreds of Kelvinator salesmen across America, stand back of this Plan.

You will undoubtedly be surprised by the figures which can be applied to your territory—but they are figures you can bank on to develop load on a pre-determined basis.

The interesting chart above is but one of many in a special booklet, "The Kelvinator Commercial Sales Production Line", a copy of which will be sent you with full details about the Silver Jubilee Commercial Line.

It has been our privilege to work with many utility officials on commercial equipment development; it is a pleasure to offer our experience to you. Write *Kelvinator*, Division of Nash-Kelvinator Corporation, Detroit, Michigan.

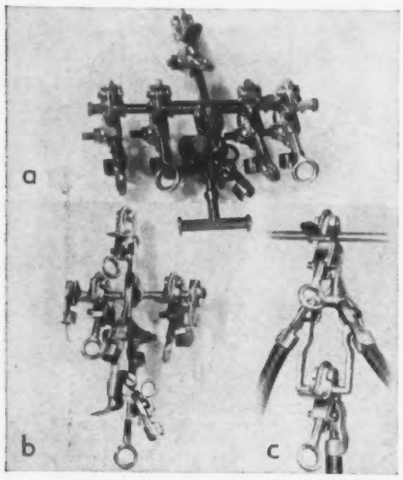
KELVINATOR

1914 *Twenty-Five Years of Progress* 1939

NEW EQUIPMENT

Grounding Clusters

Three new grounding clusters have been announced for use on rural lines or for any light four-, three- or two-wire construction. As illustrated, they were designed primarily for: (a) Grounding to neutral on four-wire construction, also provides two sets of temporary jumpers or a two-wire or three-wire grounding set without changing cable attachments; (b) grounding on four-wire construction where it is desirable to ground all four wires to a ground rod, clamps can be rearranged to provide a single jumper or a ground for two- or three-wire systems; (c) grounding set for single-phase, grounded neutral ridge pin or crossarm construction, may be used with or without ground rod and as a temporary jumper set.



Grounding sets; clamp capacity ranges from No. 6 solid copper to No. 4/0 stranded copper or No. 3/0 A.C.S.R. **A. B. Chance Co.**, Tips Tool Div., Centralia, Mo.

•

Light Switch

"Delay-O-Lite" switch; fits standard switch boxes; will operate minimum of 40 watts and maximum of 250 watts. **S & W Mfg. Co.**, Downey, Calif.

An adjustable toggle switch which permits the light to stay on from 20 to 60 seconds after the switch is snapped off is being marketed by this company. In the switch is a cradle which is interrupted from the "on" to the "off" position by a bi-metal latch wound with a resistance wire. Expansion and contraction of this bi-metallic element causes the delay. Resistance is wound in parallel with a variable resistor, which is adjusted according to the lighting load to be controlled by the switch.

•

Wiring Devices

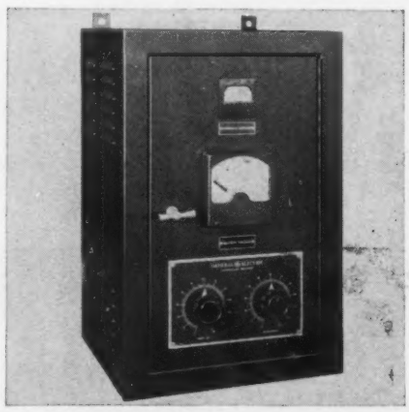
Weatherproof wiring devices; switches, outlets and switch-outlet combinations; outlet ratings, 15 amp., 125 volts, 10 amp., 250 volts; switch ratings (except four-way model) 10 amp. 125 volts, 5 amp. 250 volts. **Pass & Seymour, Inc.**, Syracuse, N. Y.

Complete line of weatherproof wiring devices is announced for installations where protection against the elements is a requirement. Compact units, for installation in a single gang switch box or flat face FS fitting, comprise the line. Each device is sealed with cover and plate gaskets. Switches are "T" rated to type "C" lamp loads. Plates are brass with baked-on aluminum finish.

•

Battery Charger

Industrial-type metal phanotron rectifier tubes are used in this automatic and self-regulating battery charger, developed for charging and maintenance service in substations, hospitals, public buildings and other places. Adjustable over a wide voltage range, the unit makes it possible to trickle-charge a fully charged battery. The rectifier will then automatically furnish more current up to the safe current limit of the tubes when the battery-terminal voltage is diminished. This adjustment is also useful in stepping up charging rate.



"Phano-Charger;" 220-volt a.c. supply, 130 volts, 12.5 amp. d.c.; also offered in a 4.5-amp. model and a 25-amp. model operating from three-phase supply. **General Electric Co.**, Schenectady, N. Y.

Mica Undercutter

Light weight and compactness are two claimed features of this portable mica undercutter, equipped with a ball-bearing universal motor and a small built-in fan piped to blow away the mica dust while undercutting commutators. A small cutter is used to permit getting closer to the riser.

"No. 62" portable mica undercutter; uses 110-volt universal motor; weight, 3 lb. 7 oz.; undercuts horizontal commutators up to 30 in. in diameter, flat commutators, to 11 in. diameter. **The Hullhorst Micro Tool Co.**, Toledo, Ohio.

•

Welding Electrode

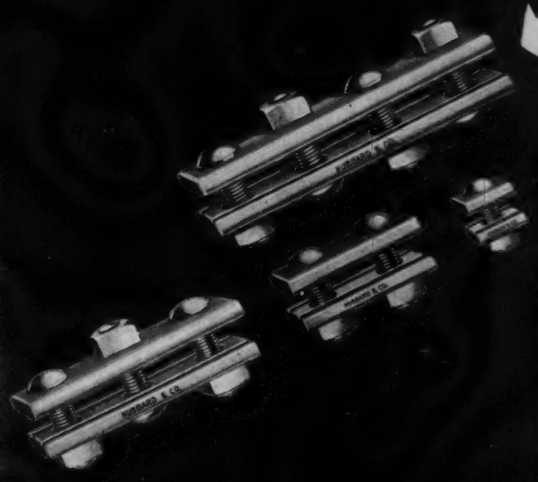
"Stainweld C" electrode, 18-8 type, with 3½ per cent molybdenum; in sizes up to 3/16 in., 11½-in. lengths. **The Lincoln Electric Co.**, Cleveland, Ohio.

Weld metal of proper physical and chemical properties for welding stainless steels having about 3½ per cent molybdenum is said to be provided by a new arc welding electrode. Coating on electrode is designed to prevent oxidation of weld metal and to keep analysis of deposited metal virtually same as the parent metal.

•

pH Recorders

New line of pH recorders and controllers for industrial plant use employs glass-electrode method of measurement. Shielded glass and Calomel electrodes are used, two types of assemblies being offered: (1) Inclosed flow type, in which the solution under measurement is pumped



THE LONG—

AND SHORT—

. . . OF GUYING PROBLEMS

FROM A PUNY PULL ON A ONE BOLT "BABY" CLAMP, TO THE TOUGHEST TUG ON THE FOUR BOLT "DADDY"—ARE SOLVED BY HUBBARD STRAIGHT-GROOVE, SUPER-GRIP GUY CLAMPS

HUBBARD AND COMPANY

PITTSBURGH . . . OAKLAND . . . CALIFORNIA . . . CHICAGO

"HANG THE LOAD ON HUBBARD HARDWARE"

"We are going straight ahead"

ONE might conclude, from hearing people talk, that this country is *built*, that its opportunities are gone, its resources exploited.

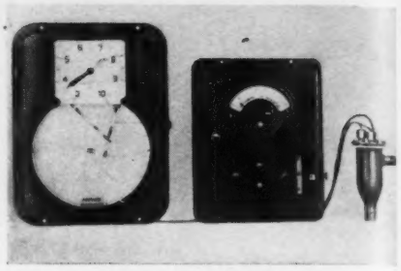
Not one word of that is true! U.G.I. believes, in its particular field at least, that the job is far from finished. Opportunities are limited only by fear and hesitation.

The future is bright for those who will not permit temporary inequities of taxation or restriction, temporary business nose-dives to blind their eyes to these facts: We live in a land that is under-populated, under-developed, a land that needs look to no other land for raw materials or markets. We live under a system of government established by our forefathers on the basis of equality. Only in America do the masses constitute the major markets for luxuries as well as necessities. We live with people who are going places.

U. G. I. is going straight ahead. It has an undertaking — as binding as a written and sealed contract — to reward its stockholders with reasonable earnings, its customers with service, its employees with jobs, the general public with the wide and far-flung benefits of business well-managed, work well done. In a country such as this, it is conservative to be progressive.

THE UNITED GAS IMPROVEMENT COMPANY

Dedicated to Better Public Service Since 1882



pH recorders and controllers; in two general types: wide strip-chart model and round-chart model; automatic controllers in electric- and air-operated models. **The Bristol Co.**, Waterbury, Conn.

or allowed to flow through the chamber and (2) immersion type, which is designed for immersion in tanks and vats. Instruments may be plugged into standard light circuit, provisions being made for automatic compensations of line voltage fluctuations.

•

Carbon Resistor

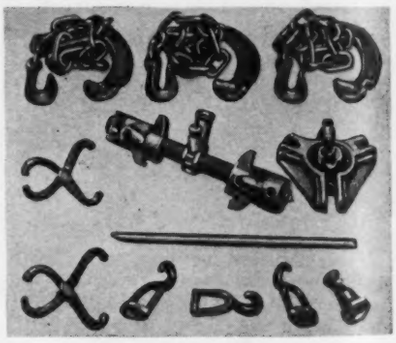
"Ohiohm" porcelain-insulated, fixed, carbon resistor; standardized in ¼-, ½- and 1-watt capacities. **Ohio Carbon Co.**, Cleveland, Ohio.

Low voltage coefficient, low heat coefficient under load and reasonable overload capacity are claimed for new porcelain-insulated carbon resistors which include electronically controlled industrial equipment among suggested uses. To provide better contact among wire lead, cap and resistor, the wire is welded, instead of soldered, to the cap and the cap is forced over a cushion of sprayed copper deposited on the ends of the resistor.

•

Maintenance Tool

Spreading and pulling together structural members or any movable objects, pushing, hoisting, lifting, lowering, clamping, bracing and tensioning are suggested applications for a new tool offered for utility construction and maintenance work. The tool is said also to remove gears, wheels, pulleys and marine propellers.



"Util-A-Tool;" 10-ton capacity; offered in five sizes. **Templeton, Kenly & Co.**, Chicago, Ill.

•

Photo-Electric Equipment

Light from a 5-cp. bulb passes through an infra-red filter to give an "invisible" beam of "black" light which may be projected up to 50 ft. to the control device associated with this photo-electric cell equipment and operating an alarm bell,

"AND NOW CUSTOMER RELATIONS HAVE BEEN GREATLY BETTERED"

. . . Report Potomac Electric Power Executives After Less Than A Year's Use of Customer Service and History Records

On April 11, 1939, Mr. Jones advised us:

"Since the installation of our Customer Service Files, we have reduced the time necessary to issue a duplicate bill from an average of ten minutes to an average of one and one-half minutes per bill. The time necessary to handle a service order has been reduced from an average of fifteen minutes per order to slightly less than two minutes per order.

"Complaints have, in our opinion, been reduced through this installation. These complaints had been in connection with the time necessary to handle a customer.

"Insofar as improvements in public relations are concerned, we are convinced that they have been greatly bettered through this installation for reports coming into the office from various sources indicate this to be the fact.

"There has been a decided decrease in the number of errors through the use of the permanent service order card.

"We have found the Customer History Record to be invaluable in reopening accounts previously closed for various reasons for, from this record, we can always obtain the name in which the account was previously carried.

"We can definitely say that after this file has been in operation a year our records would then be sufficiently complete to enable us to concentrate on those accounts that need collection effort and by being able to handle this on a selective basis, there will be a definite reduction in operating costs."

HOW CUSTOMER GOOD WILL WAS DRAMATIZED AT WHITE SULPHUR SPRINGS

The above is a picture of a demonstration of the operation of Remington Rand Customer History and Customer Service Records, Unit Plan of Bookkeeping and Personal Service Desks at White Sulphur Springs, W. Va., April 19th.

The demonstration graphically illustrated customer satisfaction at elimination of counters, and ability to transact all business with one clerk and cashier. It proved that a company can speed service, reduce errors and much clerical work.

For copy of the Potomac Electric Power report or complete information write Public Utilities National Accounts Division, 315 Fourth Ave., New York City.

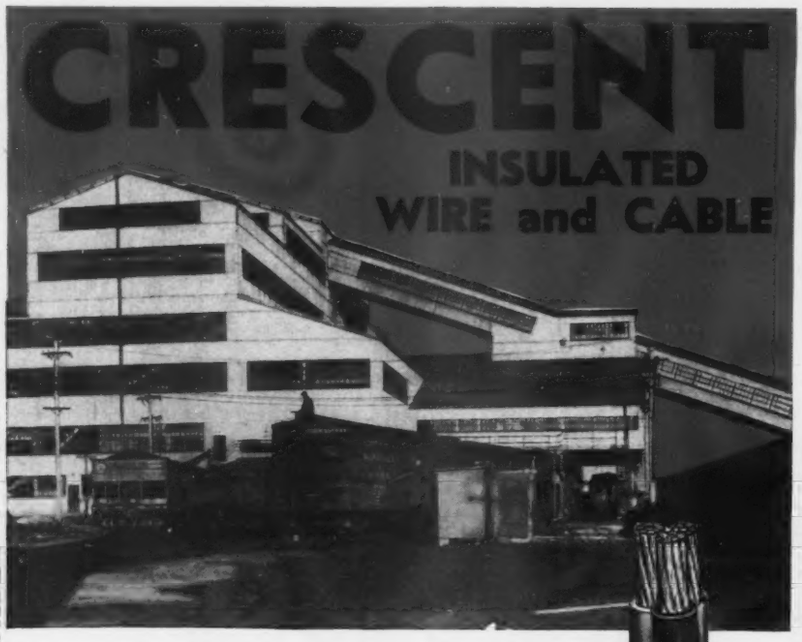
Remington Rand Inc. BUFFALO, NEW YORK
BRANCHES EVERYWHERE

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESFLEX NON - METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESCENT
INSULATED
WIRE and CABLE



COAL MINES Use It! . . . .

Where safety of human life and limb as well as uninterrupted production depend on a constant flow of current for power and light, you'll find Crescent Wire and Cable among the chosen few.

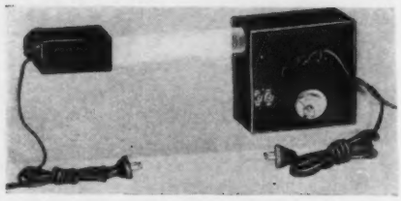
Imperial Cable, shown at the right, is an all-rubber portable cable which combines every feature of toughness, durability and safety required in the severe duty encountered in and around mines. Also, you can count on it to fill, with entire satisfaction, the most difficult portable cable installations.

ADEQUATE WIRING SERVES AND SAVES

CRESCENT
INSULATED WIRE & CABLE CO. INC
TRENTON, NEW JERSEY

Atlanta Baltimore Boston Buffalo Chicago Cincinnati Cleveland
Detroit Indianapolis Kansas City Los Angeles Minneapolis
New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

CRESCENT ENDURITE SUPER - AGING INSULATION



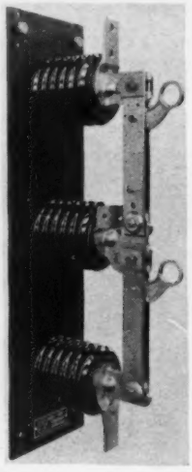
"Rehtron Burglar Alarm Robot;" rated at 11 watts, for use on 110-volt, 60-cycle a.c. Rehtron Div., **A. C. Rehberger Co.**, 2134 North Magnolia Ave., Chicago, Ill.

buzzer, light, or other warning device. Intended primarily for use as a burglar and fire alarm, the device is said to respond to rising smoke which intercepts the light beam. To guard against false alarms, a stabilizing relay scheme is used to compensate for momentary power drains or failures. A "power valve switch" automatically resets the alarm after current is restored in the case of a prolonged power failure.

•

Disconnecting Switch

Inside lock of this disconnecting switch is combined with a common hinge and contact member at the center insulator unit to give shorter blades and decrease in width of current-carrying parts. Both design factors are advantageous when switches are used in cubicles, cell structures and other restricted places, where available striking distance between open switch blade and cell doors is limited. Tongue-type contacts are of line-pressure type with full-floating blades.



Disconnecting switch; single pole, double-blade, tandem-throw, 15 kv., 600 amp.; base for mounting on flat surface or 1¼ in. pipe frame. **Delta-Star Electric Co.**, Chicago, Ill.

•

Magnetic Clutches

Style "F" magnetic clutch and Style "FF" magnetic clutch-brake combination; in a variety of sizes and combinations. **Stearns Magnetic Mfg. Co.**, Milwaukee, Wis.

New magnetic clutches are announced as compact, readily accessible clutch and clutch-brake combination for flywheel or through-shaft application to power presses, power shears, punch and stamping presses, die casting and similar operations. Simplicity of design is a claimed feature of the devices; it is also stated that they can be installed in the field to replace jaw or pin clutches or other types of mechanical drives.

•

Projector Spot Lamp

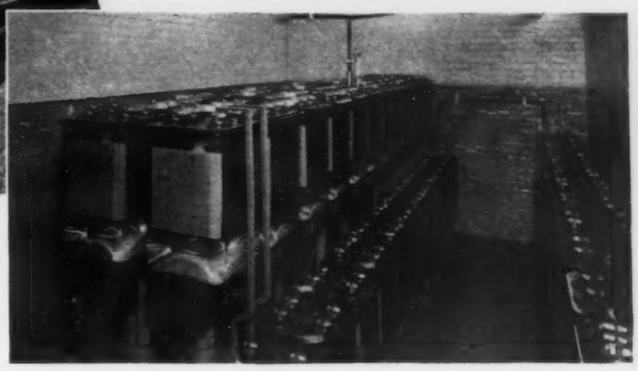
Mazda projector spot lamp, 150 watts, rated life, 1,000 hours; reflector showcase lamp, 40 watts, rated life, 1,000 hours. Lamp Div., **Westinghouse Electric & Mfg. Co.**, Bloomfield, N. J.

Supplemental commercial lighting and local lighting in industrial plants are in-

Above: Burlington Generating Station of Public Service Electric and Gas Company.

Exide
CHLORIDE
BATTERIES

Below: Sixty-cell Exide-Chloride Battery which not only operates oil-circuit breakers but provides ample light within the station in emergencies.



EQUIPMENT *MUST* BE GOOD TO EARN A PLACE IN THIS MODERN PLANT

ON THE New Jersey bank of the Delaware River, at Burlington, from which point it supplies light and power to many communities of central New Jersey, the Public Service Electric and Gas Company has erected a 55,000 kw. generating station that is a striking example of modern power plant design.

In this highly efficient station, one 700 lb. boiler, burning fuel oil or pulverized coal, and equipped with flue dust precipitator, supplements ten 200 lb. stoker-operated boilers in feeding the three 12,333 kw., low pressure condensing and one 18,000 kw., high pressure superimposed turbine generators. In addition, extensions of boiler and generator rooms are planned to accommodate two 1,400 lb. boilers and one 100,000 kw., cross-compound, condensing turbine generator to be placed in service in 1941.

In keeping with the high quality of all this equipment, a 60-cell Exide-Chloride Battery, with a capacity of 564 amperes, was installed for operation of the oil-circuit breakers and to provide emergency lighting within the station.

The Exide-Chloride is one of the most widely used storage batteries ever designed for stationary service. With its remarkable Manchester positive and Box negative plates, its life is exceptional; its dependability and comparative freedom from trouble, traditional. Write for Bulletin 204 . . . then you can understand why the Exide-Chloride is preferred by so many operating and consulting engineers.

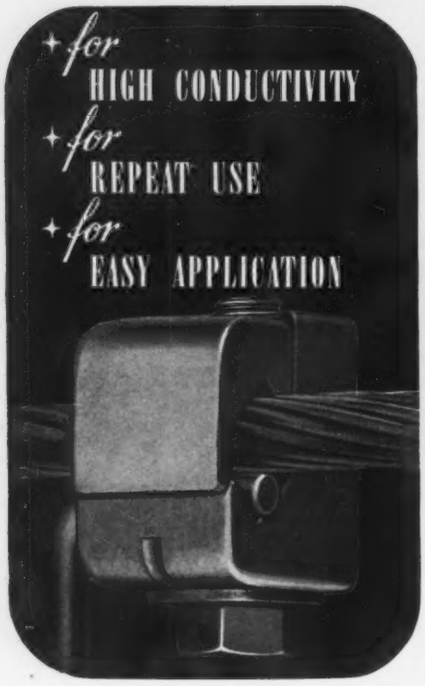
THE ELECTRIC STORAGE BATTERY COMPANY

The World's Largest Manufacturers of Storage Batteries for Every Purpose

PHILADELPHIA

Exide Batteries of Canada, Limited, Toronto

Specify THE **FARGO** UNIT CONNECTOR



+FOR HIGH CONDUCTIVITY

At low torque Fargo Connectors *"grip like a vise"*, give a perfect contact, high in conductivity, low in voltage drop. Jaws are vibration-proof.

+FOR REPEAT USE

You can use Fargo Connectors over and over again. Fargo design distributes service strains evenly, Fargo EVERDUR construction is distortion proof.

+FOR EASY APPLICATION

The one-piece Fargo has no parts to lose, is always threaded. Just hook it on the run wire, insert the tap and tighten the bolt.

• • •

Ask your L-M representative to show you a sample, or write to South Milwaukee, Wisconsin, for Fargo Connector information.

Made by
Fargo Manufacturing Co.
DISTRIBUTED BY

LM

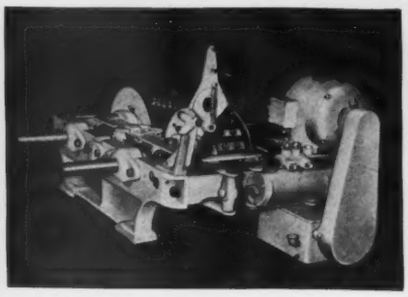
LINE MATERIAL CO.

cluded among suggested uses for a new 150-watt projector spot lamp. With a bulb of heat-resistant glass, the new lamp resembles the "PAR-38" projector flood lamp, but is smaller, lighter and uses an inside-stippled lens to provide a minimum widening of the beam. Lamp is said to produce 10,500 cp. in the center of a beam about 20 deg. wide. It has a medium-screw base. This company has also brought out a 40-watt reflector showcase lamp with T-10 bulb, supplementing its previously announced 25-watt model.

•

Variable-Speed Control

For use with its variable-speed transmission to provide automatic speed regulation, this company has developed a new hydraulic automatic control. The piston-type control is mounted at one end of the transmission frame; piston connects to one set of the shifting levers, while its housing cylinder connects to the other side. Mounted on



"Piston-type" hydraulic automatic control; motors driving oil pump are regularly furnished single-phase a.c., for 110, 220, 440 or 550 volts. **Reeves Pulley Co.**, Columbus, Ind.

the cylinder is a two-way valve actuated by a connecting rod attached to a speed-indicating device on the driven machine. This valve directs the flow of oil to either side of the piston to change transmission speeds by shifting the levers and changing disk and belt diameters. Pressure of two or three ounces is said to be sufficient to change speed. A small electric motor operates oil pump supplying the hydraulic power.

•

Flush Switch

"No. 4361" three-position, flush tumbler switch; fits standard deep wall case; rated 20 amp., 125 volts, 10 amp., 250 volts. **The Arrow-Hart & Hegeman Electric Co.**, Hartford, Conn.

New flush switch incorporates a double-pole, double-throw tumbler switch mechanism with three distinct lever positions, one at each end of the throw and one in the center. To switch from one position to the other, the lever must be stopped at the center before moving to the second position. Switch is designed for two-circuit control, two-speed motors, permanent and auxiliary lighting, dark room control of colored and bright lights and for similar applications.

•

New Floodlight

Developed as a general-purpose fixture for illuminating grounds, buildings, service stations, athletic fields, and the like, this porcelain-enameled floodlight is said to provide a higher degree of light projection and to assure a wide spread of light at the same time. It may be pole-mounted

WHEN YOU SEE THE "CITY OF LIGHT"

don't miss...

➧ the collateral displays in the same Consolidated Edison building at the World's Fair.

➧ They show you how we handle problems which every public utility faces.

➧ TAXES...RISING COSTS OF SUPPLIES AND LABOR...EMPLOYEE RELATIONS...RATE REDUCTIONS... RESPONSIBILITY TO INVESTORS...

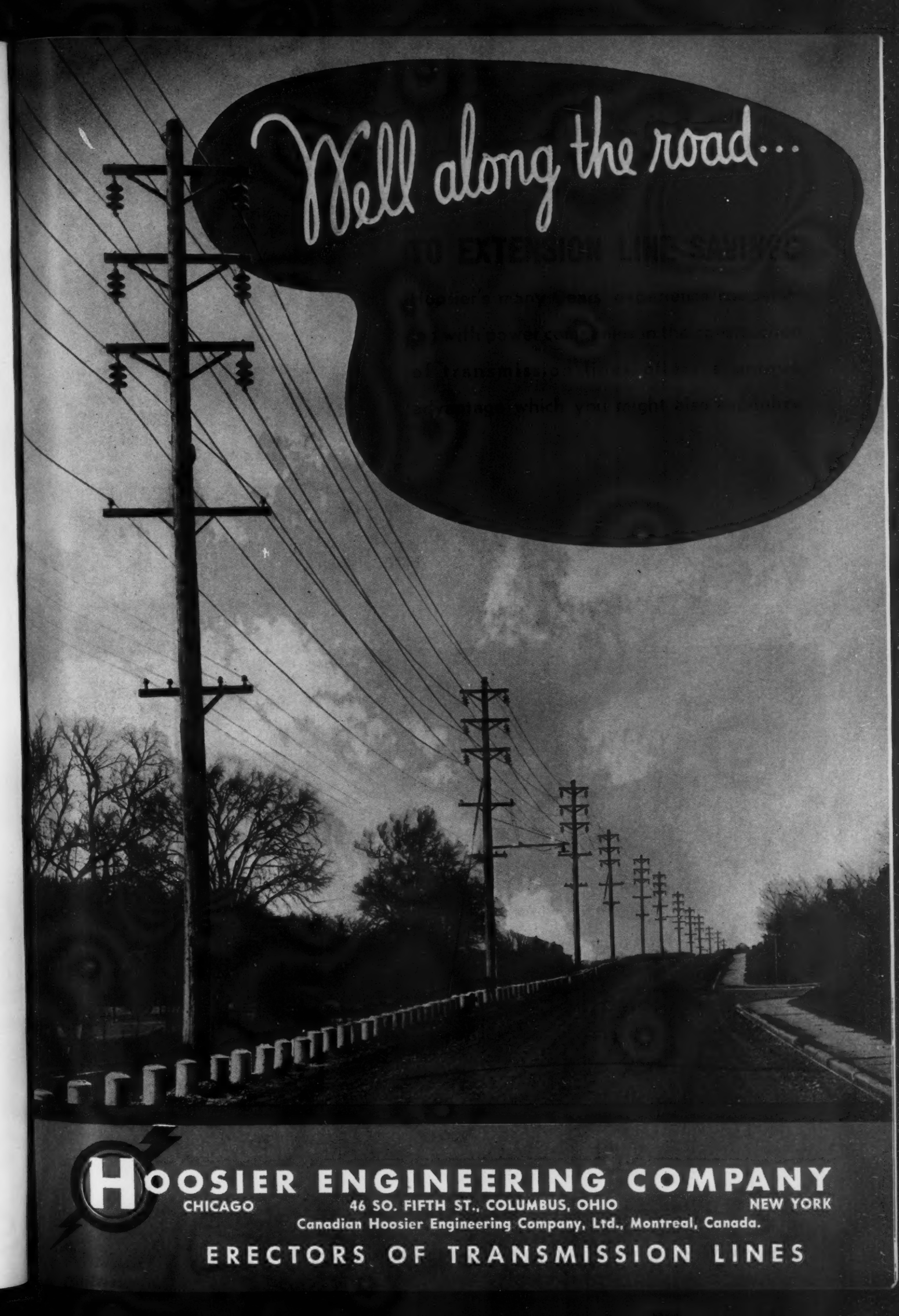
➧ These and other animated, lighted murals constitute a "Report to Customers" which we believe will interest all utility men.

➧ Admission is free.

"THE CITY OF LIGHT" *is on the Plaza of Light, near the Fair's Theme Center.*

SERVICE

THE SYSTEM COMPANIES OF
CONSOLIDATED EDISON
New York & Queens Electric Light & Power Company
Brooklyn Edison Company, Inc.
Westchester Lighting Company
The Yonkers Electric Light & Power Company
New York Steam Corporation



HOOSIER ENGINEERING COMPANY

CHICAGO 46 SO. FIFTH ST., COLUMBUS, OHIO NEW YORK

Canadian Hoosier Engineering Company, Ltd., Montreal, Canada.

ERECTORS OF TRANSMISSION LINES

MORE REVENUE?

you bet we want it

THE FACE OF EVERY UTILITY EXECUTIVE FITS THIS PICTURE

ROA$TER

1 ELECTRIC ROASTERS move low-use customers over onto PROFIT side.

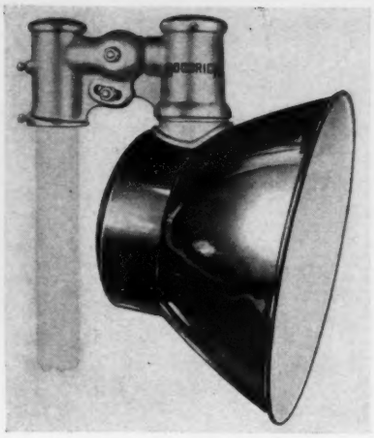
2 ELECTRIC ROASTERS use current at HIGH blocks in rate structure.

3 ELECTRIC ROASTERS rank FOURTH as load-builders among home appliances.

4 ELECTRIC ROASTERS require NOT ONE CENT of added capital investment for utility.

5 ELECTRIC ROASTERS already rank FIFTH among appliances retailing for $20 or more.

WRITE NOW FOR



"Projecto" floodlight. **Goodrich Electric Co.**, Chicago, Ill.

or attached to walls and other flat surfaces by means of the bracket arm which may be adjusted to direct the flood of light as wanted.

•

TECHNICAL BULLETINS

TURBINE OPERATION—Turbine operating data for 1937, turbine operating experiences of operating utility companies, and statements by manufacturers, including reports on new installations are included in Publication No. F14, published by the Edison Electric Institute. Condensers and circulating water pumps, cooling towers and boiler feed pumps are also included in the booklet, available from E.E.I. headquarters, 420 Lexington Ave., New York, N. Y., and priced at $1.75 to non-members in the U. S.

SHIPBOARD INSTALLATIONS—The recommended practice for electrical installations on shipboard is outlined and discussed in publication No. 45 of the American Institute of Electrical Engineers. Definitions, d.c. and a.c. installations and propulsion equipment are covered. Copies are obtainable from A.I.E.E. headquarters, 33 West 39th St, New York, N. Y., at $1.50 each.

STREET LIGHTING—"Advanced Street Lighting Practice" is the title of a booklet prepared by Holophane Company, Inc., 342 Madison Ave., New York, N. Y. It is designed to serve both as a handbook and as a source of general information for lighting engineers interested in streeet lighting. In addition to a discussion of general considerations, the company's line is catalogued; a useful feature is a summary of the line, including suggested applications for the different units.

AMERICAN STANDARDS—The new annual list of American Standards and Safety Codes includes some four hundred nationally approved standards and codes, with specifications indexed alphabetically and also industrially according to subject. The list may be obtained free of charge from the American Standards Association, 29 West 39th St., New York. N. Y.

MONEL PROPERTIES—Engineering properties of Monel are presented, in revised form, in Bulletin T-5, issued by the Development and Research Section of The International Nickel Company, Inc., 67 Wall St., New York, N. Y. Only mechanical properties are taken up; strength, ductility, corrosion resistance and working properties are considerations.

MANUFACTURING - MARKETS

Westinghouse to Pay Wage Bonus of 5%

Reflecting the steady increase in bookings and earnings, Westinghouse Electric & Manufacturing Co. distributed to employees a wage adjustment bonus of 5 per cent, compared with 3 per cent in April.

The May bonus, which is based on the rate of earnings over the immediately preceding three months, indicates that net income for April was approximately $1,210,290. Net income for March had previously been indicated at $922,188 and $815,833 for February. For the three months ended April 30 the earnings were indicated at $2,948,311, as against reported net profit of $2,356,150 for the quarter ended March 31.

The bonus payment for May indicates that April earnings were nearly double those for January and were the highest for any month this year to date. So far this year new business each month has been better than the preceding one. New orders in May were well above those for April.

•

Business Extended by Globe-American

Announcing a general program of expansion, the Globe-American Corp., Kokomo, Ind., will market complete new lines of dutch oven ranges for electricity, gas, coal, wood and combinations of these fuels. Also included in the new program are "Glow Boy" and "Ray Boy" heaters for coal and oil.

In line with the expansion, Alden Chester, general manager, has announced three additions to the executive sales staff: Pierre L. Miles, vice-president; Russel Ray, merchandising manager, and George Boeddner, special account executive. Mr. Miles was until recently with the Lindemann & Hoverson Co. of Milwaukee. Previously he had been general sales manager of Edison General Electric Co. and sales manager with Nash-Kelvinator in the range division. He will maintain offices in Chicago to direct the national sales of a special line of Globe-American electric ranges. Mr. Ray was previously a sales executive with the Chambers Corp. and Mr. Boeddner was formerly with the Norge division of Borg-Warner.

•

Manufacturers Make Sales Assignments

Electrical manufacturing companies have recently made the following appointments to their sales staffs:

W. T. Christy, assistant manager of General Electric specialty appliance division, has been appointed manager of the new factory distributing branch at St. Petersburg, Fla. C. E. Curtis will be operating manager of the branch. The factory branch in Florida came into being when George Patterson, Inc., relinquished its distributorship for G. E. appliances.

Graybar Electric Co., Inc., New York, has announced that J. A. Mayer, manager at Cleveland since 1936, is now at the general department of the company as assistant general power apparatus sales manager.

General Electric Supply Co. has transferred A. J. Lutz to the Chicago offices, where he will assume the position of district supply sales manager. He was district manager in Seattle for the past fifteen years.

General Electric Vapor Lamp Co. has transferred A. N. Martinson, formerly manager of the Pittsburgh office, to the Hoboken office, to take charge of district sales.

Roller-Smith Co. has announced the appointment of John W. Clarke, Chicago, as its agent for the eastern part of the state of Iowa.

•

April Truck Shipments

Domestic shipments of electric industrial trucks and tractors during April totaled 65, as against 86 in March and 57 in April a year ago, according to the Department of Commerce.

Power Industry Used Less Metal in 1938

Installation of copper by the electric light and power industry, excluding governmental projects, totaled 62,200 short tons in 1938, as compared with 83,000 tons in the previous year and with the peak of 130,000 tons in 1930, according to the American Bureau of Metal Statistics.

Of the 1938 total, the large or metropolitan companies accounted for 18,700 tons, as against 24,800 in 1937. Old copper sold, an indication of the amount removed, totaled 17,900 tons in 1938 for the industry, as against 20,900 in the previous year and the peak of 36,000 tons in 1930.

Consumption of other non-ferrous metals by the industry last year included 16,300 short tons of lead, as against 23,200 tons in 1937, 9,300 tons of the 1938 total being used by metropolitan companies, as against 12,700 in 1937. The industry used 8,600 tons of aluminum in 1938, as against 12,000 tons in 1937, metropolitan companies using 400 tons last year, as against 1,500 in the year previous.

•

Railley Corp. Wins Suit

The recent suit filed by Railley Corp., originator of the "Pin-It-Up" lamps, against the Frankelite Co., the Federal Lighting Products Co. and the Bailey Co., department store, has been settled out of court and a consent decree entered in favor of Railley Corp.

•

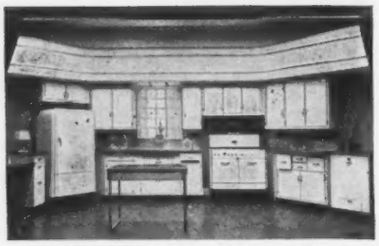
Washer-Ironer Shipments in April Rise Over 1938

Household washer shipments in April continued their advance over 1938, totaling 116,199, or 22.1 per cent more than the total, 95,158, reported for the similar month of 1938, according to J. R. Bohnen, executive secretary-

ADEQUATE WIRING SERVES AND SAVES

Get to know Wiremold

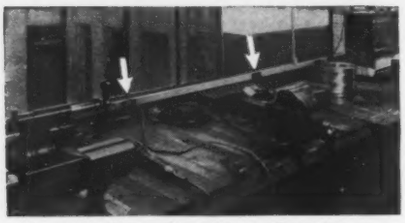
Read how



Modern Kitchen Lighting with Wiremold Fluorescent Strip

Plugmold installation in store display counters

Wiremold sells better lighting in office buildings



Showing Plugmold installation bringing convenient electrical outlets for easy accessibility to bench equipment.

WIREMOLD SYSTEMS HELP YOU BUILD APPLIANCE LOAD

Every new outlet connected to your lines . . . every time you make it easier, more convenient for customers to use appliances . . . you build both new load and new customer goodwill.

Consider Plugmold, the Wiremold Multi-Outlet Assembly, for example. Here is the NEW standard of electrical convenience for modern homes.

With Plugmold, outlet potentialities are limited only by the customer's convenience and needs. She can have them *just* where she wants them. She can have new ones added by her contractor in a few minutes at any time.

And you . . . the utility . . . have the very definite advantages of efficient, safe, trouble-free, more-than-adequate wiring . . . fewer long extensions to generate service calls . . . a constant silent salesman in your customer's home.

USE WIREMOLD DATA SHEET SERVICE FREELY . . .

Wiremold Data Sheets and the help of experienced Wiremold Engineers are always available to help you in selling adequate wiring, better lighting, higher standards of service to your customers. Write us today.

ADEQUATE WIRING SERVES AND SAVES

WIREMOLD *Your* LOAD BUILDER

THE WIREMOLD COMPANY · HARTFORD, CONN.

treasurer of the American Washer and Ironer Manufacturers' Association.

April ironer shipments totaled 9,047, compared to 7,111 a year ago, an increase of 27.2 per cent. Ironers shipped in the four months were 36,878, compared to 37,628 in the similar period of 1938.

For the first four months of this year washer shipments totaled 508,718, compared to 379,528 in the same period of 1938, an increase of 34.0 per cent.

•

Air Conditioning Orders Show First Quarter Gain

Orders booked for air conditioning systems and equipment during the first quarter, as reported by 267 manufacturers, were valued at $11,886,172, according to the Department of Commerce. Corresponding figures for 1938 are not available, but orders booked during March were valued at $5,185,743, as against $3,360,165 in February.

On the basis of statistics presented by 125 manufacturers, a previous series maintained by the department, orders during the first quarter this year were valued at $10,983,356, as against $9,749,291 in the corresponding period of 1938, a gain of approximately 12.7 per cent.

•

Shipments of Oil Burners Show First Quarter Gain

Domestic shipments of oil burners during the first quarter totaled 26,095 units, as against 18,879 in the first quarter last year and 32,248 in the first quarter of 1937, according to the Department of Commerce.

Domestic shipments in March were 10,287 as against 7,378 units in February and 7,461 units in March a year ago.

•

Vacuum Cleaner Sales Up

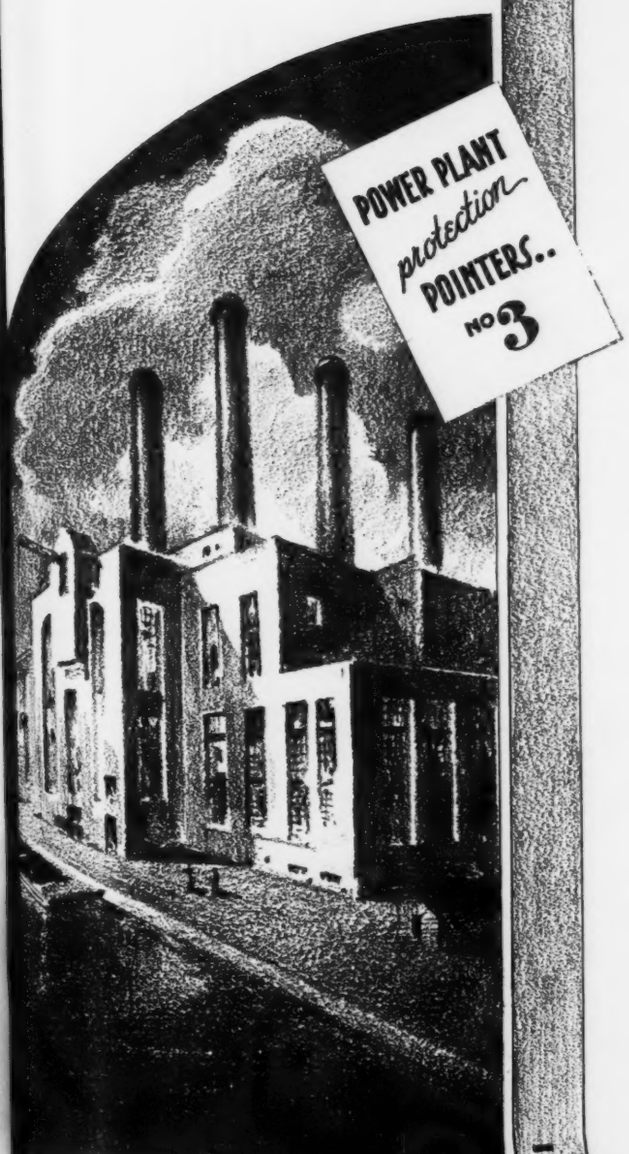
Electric vacuum cleaner sales reported for April totaled 125,026, compared with 120,925 in the same month of 1938, C. G. Frantz, secretary of the Vacuum Cleaner Manufacturers' Association, has announced. For the four-month period sales totaled 492,202, compared with 493,723 in the same period of 1938.

New York Metal Prices

	May 29, 1939 Cents per Pound	May 24, 1939 Cents per Pound
Copper electrolytic	10.00*	10.00*
Lead Am. S. & R. price	4.75	4.75
Antimony	12.00	11.75
Nickel Ingot	35.00	35.00
Zinc spots	4.89	4.89
Tin Straits	49.00	48.70
Aluminum, 99 per cent.	20.00	20.00

* Delivered Connecticut Valley.

SPECIALISTS IN *Power protection*



• • • whose understanding of your problems increases your operating efficiency.

Guesswork has no place in your power-plant protection requirements. That's why "Ocean and Columbia" assigns only experts to appraise your needs — to prevent losses to you by **preventing** accidents.

"Ocean and Columbia" specialists make thorough tests and inspections of all equipment insured by this powerful financial organization, on a schedule which does not interfere with normal operation. They are trained to detect and correct conditions which cause failures or inefficient operation. New developments that require highly specialized knowledge are handled by experts whose job it is to keep abreast of those developments. Many authorities, the leaders in their respective fields, are available to serve you should occasion arise.

It's to your profit . . . and to ours . . . to see that accidents don't happen. That's why "Ocean and Columbia's" efficient staff of experts is constantly on the job . . . to serve you better . . . to help you maintain **and increase** your operating efficiency. But if the unforeseen does occur — when threatened accident becomes reality — then "Ocean and Columbia" engineers will plan with you to hasten restoration — will see that you are honestly reimbursed without delay.

Send for further information — TODAY.

INDUSTRIAL *and* UTILITY POWER PLANT *insurers*

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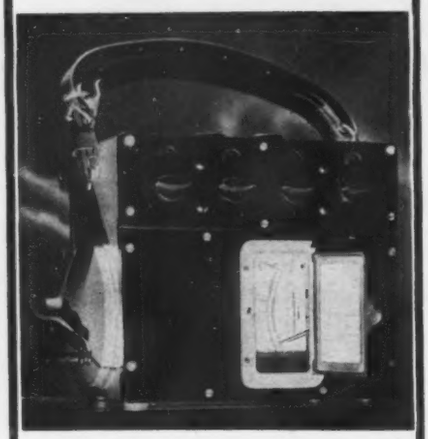
Canadian Branch: The Ocean Accident & Guarantee Corp., Ltd., Federal Building, Toronto, Ontario
Cuban Correspondent: Compania Cubana de Fianzas, Amargura 23, Havana, Cuba

"MEGGER"



"Bridge-Meg" Resistance Tester. A combined "Megger" Insulation Tester and Wheatstone Bridge—a complete resistance measuring outfit.

"..... have saved Hundreds of Dollars"

The Chief Electrician of an industrial plant in California is responsible for the operation of over 500 motors, ranging from 1 to 800 hp.,—in use 24 hours per day. If insulation fails, there is *trouble*. And trouble costs money.

About three years ago, upon advice of a Consulting Engineer, they purchased a "Bridge-Meg" Resistance Tester. "We used to guess at insulation" says the Chief Electrician, "now our 'Megger' Tester tells us just what we want to know, and we have saved *hundreds of dollars*."

They follow the simple and practical "Megger" Test Record system, which gives them a "case history" for the insulation of each motor. And since the "Megger" instrument is of the "Bridge-Meg" type, it never fails to help them locate trouble after it is detected.

Write for Bulletin 1615-W just issued, describing the "Bridge-Meg" Resistance Tester.

JAMES G. BIDDLE CO.

ELECTRICAL INSTRUMENTS

1211-13 ARCH STREET PHILADELPHIA, PA.

Other Biddle Specialties:

"Megger" Ground Testing Instruments
"Megger" Capacitance Meter
"Megger" Direct-Reading Ohmmeters
"Ducter" Low Resistance Testing Sets
"Dionic" Water Tester
"Frahm" Vibrating-Reed Tachometers and Frequency Meters
"Jagabi" Rheostats
"Jagabi" Speed-Measuring Instruments

Field Reports on Business

The continued stream of incoming orders, although small in some instances, has been encouraging. In the Middle West business appears slightly better. A great deal of new building is in progress on the Pacific Coast. New England reports substantial increases in sales of electrical equipment during the first five months this year. Government spending is to spur summer trade.

NEW YORK

Utility executives from all sections of the country will be able to get a good birdseye picture of conditions throughout the country next week at the annual convention of the Edison Electric Institute. It is likely that many plans for the summer and next fall will be formulated during the three-day meet.

With construction contracts during April rising to an eight-year peak and the total for May expected to be more than double that of a year ago, opinion is that activity will continue through the summer at the present high level. There has been a great deal of utility building, with more planned later.

A bright spot in the national picture was given by the National Association of Purchasing Agents in that it was found that inventories are at a low level and any pick-up in buying would start a new wave of manufacturing activity. Government war orders are expected to lift industrial activity during the summer.

It is expected that the recent reduction in steel prices will encourage new buying and lift production levels. Government economists believe that the same favorable reaction to the cut will be shown now as was the case last October.

The continued high rate of power production and steady rise in utility earnings has caused many companies to view the future in the light that further expansion of facilities is likely to be needed. Any move in this direction would react favorably on manufacturing activity and earnings.

NEW ENGLAND

Substantial increases in sales of electrical equipment in this area for the first five months of this year as compared with the corresponding period of 1938 and indications that this trend will carry through for the first half of the year are reported by a number of prominent representatives of this district. Approximately 50 per cent increase in the volume of small motor sales is reported by one executive; the May sales record of another company will reach a new high during the current month, according to one well known district sales engineer.

Central station equipment sales are ahead of last year by a comfortable margin; heavy electrical machinery and panelboard apparatus required in the program for expansion of naval forces are among leaders in activity. The Portland Elevator Co., Boston, has received an order for an electric freight elevator, amounting to $6,987, to be installed in the automatic machine shop of the Newport (R.I.) Naval Torpedo Station.

During the past week a new 60-kw. all-electric kitchen was opened in the Whittier Hotel, Haverhill, Mass. Bids are being received for the construction of a sewage disposal plant designed by Boston engineers in which about 80 hp. in motors will be required for pumping units, together with switch and control apparatus. Lighting and power installations for service and filling stations are active in the Boston area. More favorable weather is attracting attention to domestic appliances. One of the best week's sales report tended by a group of Vermont central stations records purchases of 104 refrigerators, 20 ranges and five electric water heaters.

PACIFIC COAST

Privately owned building is increasing, particularly in major structures. This renewed buying confidence is reflected in such industrial business as Emeryville plant additions by Shell Oil, a $4,000,000 cement plant at Sunnyvale, Calif.; Chrysler automobile factory additions at San Leandro and Los Angeles, a 5,000-kva. steel furnace for Niles, several steam to electric dredge conversions averaging 1,200 hp. each, a $1,000,000 flour mill at Spokane, with Allis-Chalmers supplying the electric milling machinery, and good supply buying by many scattered steel and lumber mills. A typical shipbuilding plant has increased its capacity from 2,700 to 6,350 kva.

Maximum current demand of the San Francisco Exposition is 12,420 kva. Rural line construction by REA is approaching its seasonal peak. Another batch of naval construction will shortly reach the bidding stage through recent Senate approval of $12,700,000 appropriation for Pearl Harbor, Hawaiian Islands; $6,500,000 for Oakland Naval base; $6,000,00 for San Francisco; $3,000,000 for Puget Sound, and $1,750,000 for Mare Island.

Electrical business in general is running about abreast of budgets all over the territory, with sufficient input each month to serve as a nucleus.

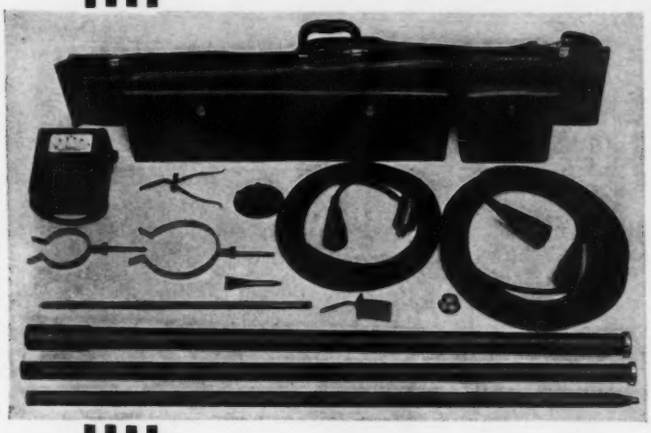
CHICAGO

On the whole, business conditions in this area appeared slightly better as improvements were reported in many fields. Gains registered were small, nevertheless a reversal of the declining trend over the past few weeks was influential in improving sentiment. Production of steel in this district rose two points and electrical power output showed a small increase over the previous week. Retail trade registered sharp gains.

Wholesale markets presented further satisfaction as commitments were rather freely placed as far ahead as 90 days, in contrast with the recent practice of limiting them to 30 days. Industrial activity showed some improvement as production schedules were increased slightly in a number of lines.

Sales of electrical equipment continue to maintain their margin of increase over last year. Appliance sales are steady, with electric roasters moving exceptionally well. Electric ranges and water heaters are averaging approximately 20 per cent above a year ago. Of 39 manufacturers reporting April sales to the Electric Association, 23 show an increase over March, while 25 show gains over a year ago.

Announcing 2 NEW ROLLER SMITH DEVICES



← "HIPOT" INSULATOR AND BUSHING TESTER

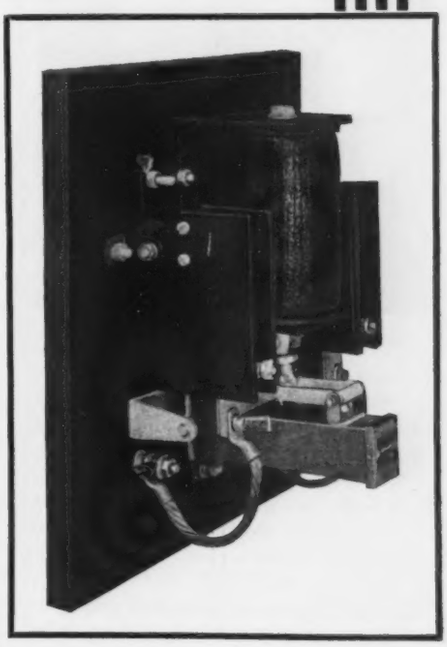
The ideal equipment for testing insulators and transformer and oil circuit breakers bushings by the voltage gradient method. Range is 13,200 to 220,000 volts. Has many advantages over the power factor method, chief of which is indicating *location* as well as *extent* of fault.

New Catalog D-11-a gives the details. Send for it. Use the coupon below.

"TYPE C" CONTROL RELAY →

The Type C Control Relay has many applications, chief of which is for insertion between the contacts of a control switch or push button and the operating solenoid of an electrically operated air or oil circuit breaker or other apparatus. Available for A.C. or D.C., trip-free or non trip-free. Very rugged. No A.C. hum. All parts accessible. Simple control wiring.

New Catalog D-12 gives the details. Send for it. Use the coupon below.



ROLLER-SMITH COMPANY
Electrical Measuring and Protective Apparatus

Bethlehem, Pennsylvania, U. S. A.

Sales Agencies in principal cities
in U. S. A. and Canada

***Use this coupon to* SEND FOR CATALOGS**

ROLLER-SMITH COMPANY, Bethlehem, Pa.
Please send me the new Catalogs checked:

☐ Cat. D-11-a ☐ Cat. D-12

Name .....

Company .....

Address .....

City and State.....

NEWS ABOUT PEOPLE

Hess Made Vice-President in Charge of Operations

Dan C. Hess, general superintendent of the Indianapolis Power & Light Co., has been elected vice-president in charge of operations. Since January 1,

1938, he assisted the late Emmet G. Ralston, who was vice-president and general manager of the company, in handling the engineering and operating problems of the Indianapolis system.

Mr. Hess entered the public utility field with the Interstate Public Service Co. for varied work in Newcastle, Indianapolis, Anderson and Crown Point, in Indiana, and in Roanoke, Va. In 1919 he started an electrical contracting business in Anderson, selling it in 1921 to take up the superintendency of the Richmond, Ind., municipal electric system, where he served for about sixteen years before going to Indianapolis Power & Light.

He has also been elected to the presidency of the Electric League of Indianapolis and has been active for years in the Indiana Electric Association.

•

▶ JOHN H. MCKENNA, widely known in electric and gas appliance sales and merchandising circles, has resigned from A. J. Lindemann & Hoverson Co., Milwaukee, Wis., with which he has been connected for the past fifteen years, to become associated with the Knapp-Monarch Co., St. Louis, Mo., in charge of utility sales in its eastern operations. Mr. McKenna is a vice-president of the Electrical and Gas Association of New York, Inc.

•

McCance Assumes Duties of Senior Vice-President

Announcement has been made by Frank R. Phillips, president of the Philadelphia Co. and subsidiary companies, of the election of Pressly H. McCance as senior vice-president of the Duquesne Light Co. and of Frank B. Saunders as controller of the Philadelphia Co. and subsidiary companies.

A native Pittsburgher, Mr. McCance became affiliated with the Philadelphia Co. in 1923 as an attorney in the law department. Since then he has served as director of personnel and as assistant to the president. He is a

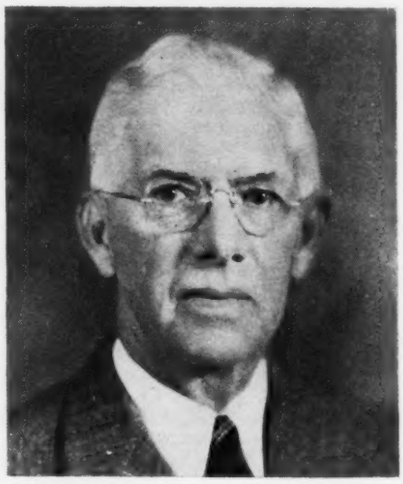
Blank & Stoller

graduate of Princeton University and the law school of the University of Pittsburgh.

Mr. Saunders joined the Philadelphia Co. in 1922 as general auditor.

R. M. Howard Completes Fifty Years of Service

A career of fifty years of service to the public was honored at Winona, Minn., recently when employees and executives of the Mississippi Valley



Public Service Co., public utility officials from Minnesota and Wisconsin and Winona citizens gathered to pay tribute to R. M. Howard, vice-president and general manager. Half a century ago Mr. Howard, then a lad of fifteen years, left school because of failing eyesight and took up the work he had tried during his summer vacations—the utility business.

In 1899 he secured the position of general manager for the Clinton Street Railway, Clinton, Iowa. Under the guidance of Mr. Howard, the property, then in a deplorable condition, was rebuilt and modernized. In 1907 he became vice-president and general manager of the Green Bay Gas & Electric Co., Green Bay, Wis., Green Bay Traction Co. and, later, the Northern Hydro-Electric Power Co. Two years later he went to Washington, Ill., where he operated an electric light plant until 1911, when he went to Winona. The Winona Railway & Light Co., predecessor of the present company, was in a

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UNIQUE MATERIALS

The production processes of Orangeburg Conduits are "different," some are exclusive and patented. You will probably find that our specialization on the problems of underground electrical raceways has resulted in many interesting differences from the usual manufacturing procedures. You will find much of interest in the laboratory, research and engineering departments whose recent achievement, ORANGEBURG NOCRETE Conduit, for use underground without concrete encasement, has substantially reduced underground distribution costs for outlying districts.

Of course, no "House of Magic,"—but the cumulative result of 46 years of manufacturing "ORANGEBURG" to meet the varying, difficult conditions of "Underground" all over the world with permanent cable protection.

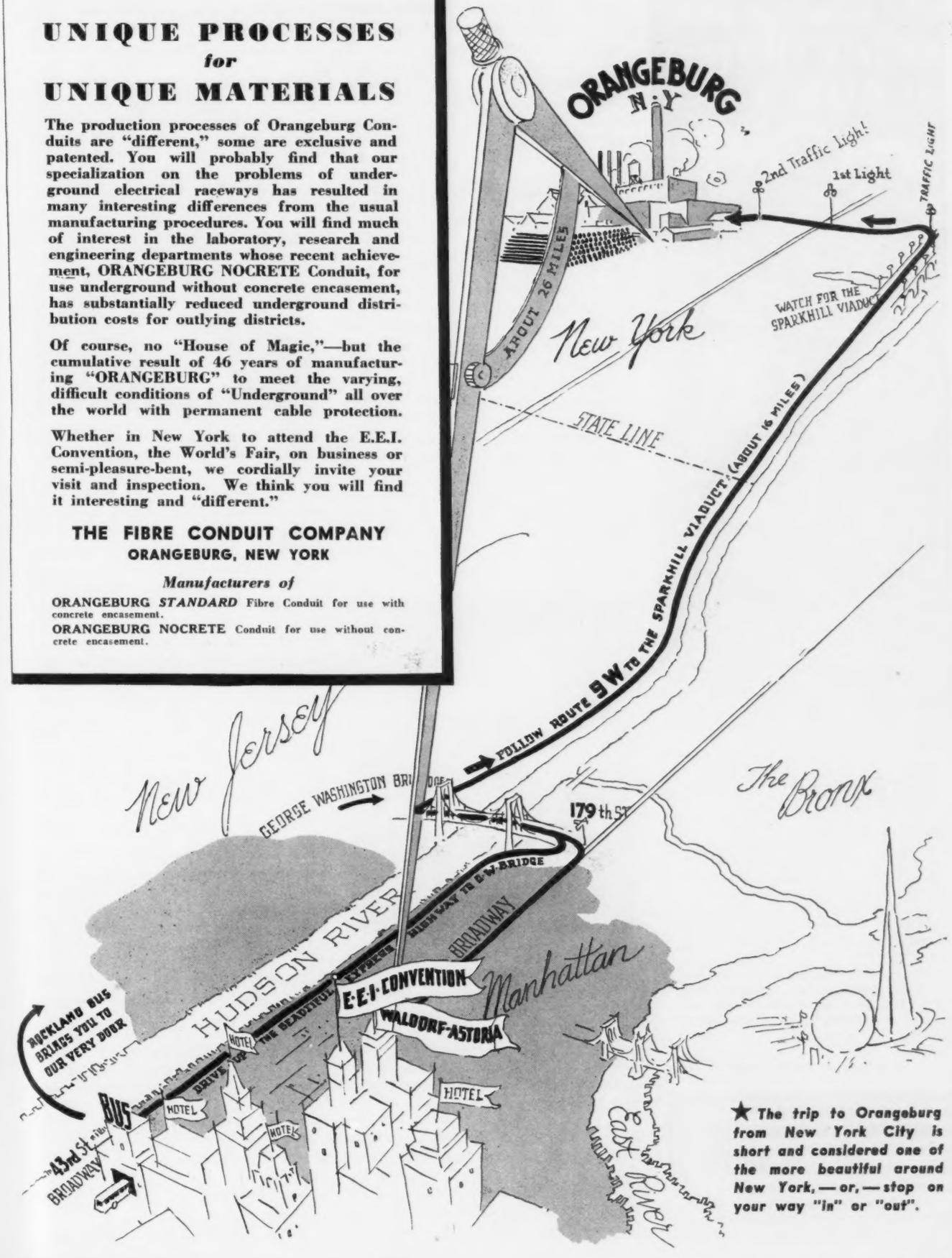
Whether in New York to attend the E.E.I. Convention, the World's Fair, on business or semi-pleasure-bent, we cordially invite your visit and inspection. We think you will find it interesting and "different."

THE FIBRE CONDUIT COMPANY
ORANGEBURG, NEW YORK

Manufacturers of

ORANGEBURG *STANDARD* Fibre Conduit for use with concrete encasement.

ORANGEBURG NOCRETE Conduit for use without concrete encasement.



★ *The trip to Orangeburg from New York City is short and considered one of the more beautiful around New York,—or,—stop on your way "in" or "out".*

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the *modern way* to join all types of BUS BARS

SIL-FOS-BRAZED BUS BARS offer many important physical advantages as well as reduced costs.

On the physical side, they produce joints between flat, square, channel or round bars that equal or exceed the bars themselves in strength and conductivity — joints that permanently retain their original electrical properties because, internally, they will not oxidize and can't work loose. In effect, SIL-FOS brazed bus bars are jointless and maintenance-free.

On the cost side, clamping, bolts and nuts, and drilling time are eliminated, a lot of copper is saved in the laps, and there is a substantial over-all saving in labor.

Get full details. Write today for Bulletin 56-EW and our Bus Bar Reprint.

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HANDY & HARMAN — FOUNDED 1867 — QUALITY SERVICE
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Agents in Principal Cities
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run-down condition, but Mr. Howard's many years of patient work brought the utility back to a position of rendering high-quality service. The employees of the Mississippi Valley Public Service Co. have won five National Safety Council public utilities contests, and Mr. Howard takes great pride in the safety record established in his company. His foresight in picking men has been exceptional. Two young men whom he trained are now general managers of other utility properties.

•

White Named Manager of Lighting Division

W. F. White has been appointed manager of the lighting division of the Westinghouse Electric & Manufacturing Co. at Cleveland. He succeeds F. R. Kohnstamm, who has been appointed sales manager of the merchandising division at Mansfield, Ohio.

Mr. White, who has been associated with the Westinghouse company since 1921, went to Cleveland in 1930 when the lighting division was located there. Under his direction many notable street-lighting installations have been designed and installed. He was responsible for much of the design and engineering of the lighting equipment and displays that Westinghouse had at the Century of Progress in Chicago,

the Great Lakes Exposition at Cleveland and the New York World's Fair.

Mr. White was recently elected chairman of the Cleveland section of the Illuminating Engineering Society. He is also chairman of the street-lighting section and aviation and searchlight group of the National Electrical Manufacturers Association.

•

▶HARVEY C. COUCH, president of the Arkansas Power & Light Co., and chairman of the board of the Kansas City Southern Railway, has been elected president of that carrier.

Crocker Heads G.E. Air Conditioning Department

Stuart M. Crocker has been named manager of the air conditioning department of the General Electric Co. Simultaneously it was announced that the commercial refrigeration activities

of the company, now located at Cleveland as part of the appliance and merchandise department, had been relinquished by the latter and assigned to the air conditioning department.

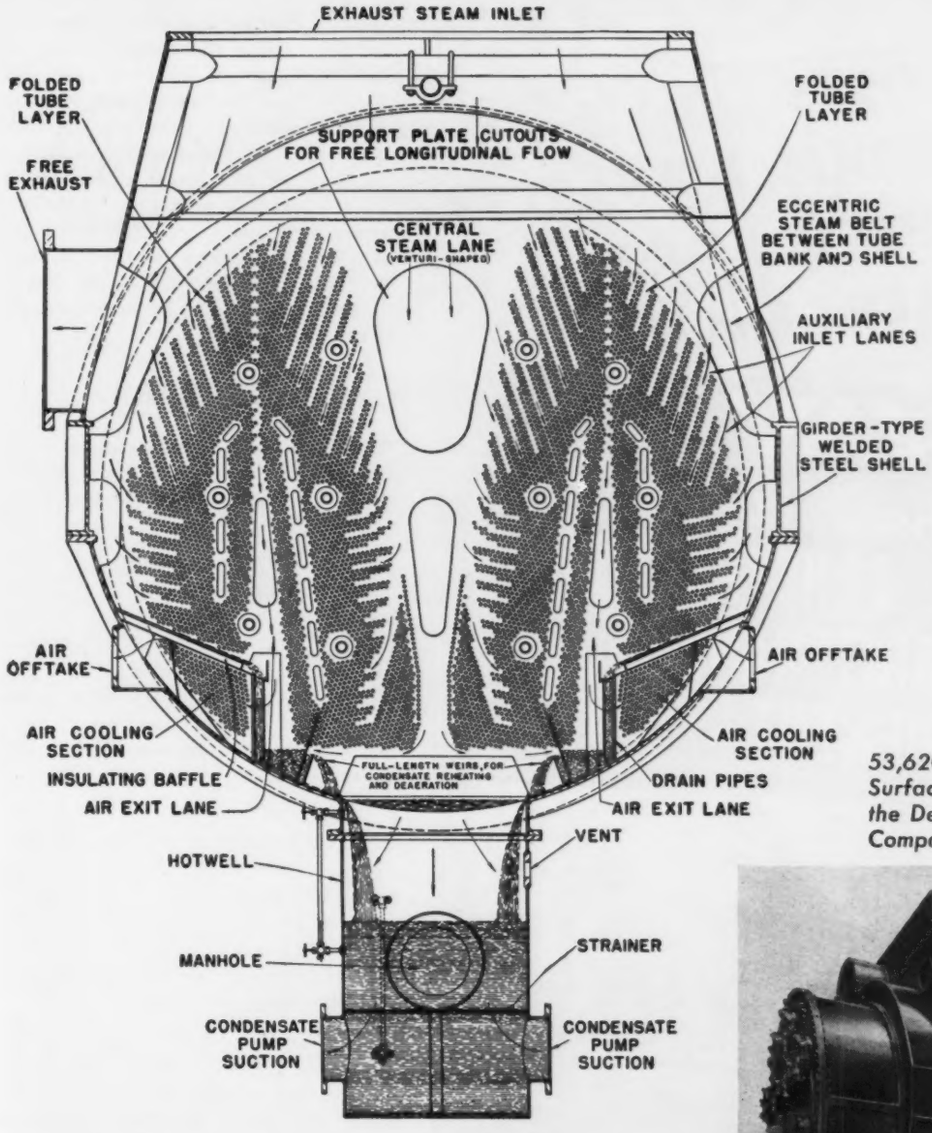
Mr. Crocker is assuming his first connection with a General Electric domestic department, but has been associated with executive divisions of the company since 1921. He has relinquished his duties as assistant to the executive vice-president to take over the new air conditioning position, but remains a vice-president of the International General Electric Co., to which he was elected in 1930. His headquarters will be at Bloomfield, N. J. Mr. Crocker has had extended experience abroad, having been closely associated with industrial and financial circles in Europe.

•

▶R. B. MCDUNNOUGH has been appointed assistant general manager of the Quebec Power Co. E. GRAY-DONALD has been named general superintendent and RENE DUPUIS has been named assistant general superintendent.

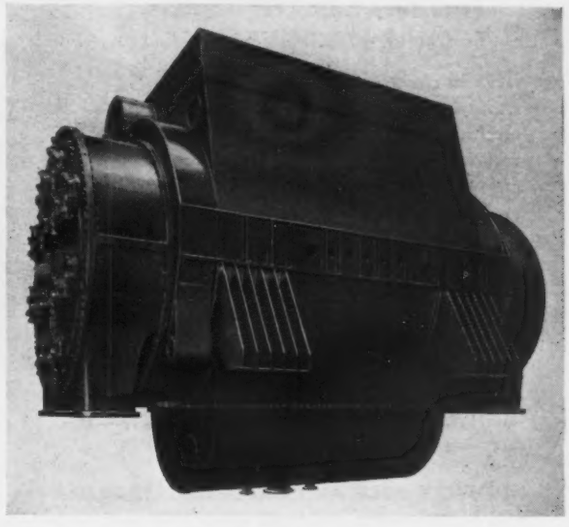
▶THAD B. LANDON, attorney for the Kansas City Power & Light Co., Kansas City, Mo., was elected a director of the company to fill the place made vacant by the resignation of C. S. McCain of Chicago last July.

▶ROY B. WILLIAMS, assistant commissioner, Bureau of Reclamation, has been appointed construction engineer of the Friant division of the Central Valley project, California. HARRY W. BASHORE, construction engineer of the Kendrick project, Wyoming, will take over Mr. Williams' duties in Washing-



WORTHINGTON DOUBLE FOLDED TUBE LAYER DESIGN
(PATENTED)
WELDED STEEL SHELL HORIZONTAL SURFACE CONDENSERS
Typical transverse section for large single pass units

53,620 sq. ft. Worthington Steel Plate Surface Condenser, recently installed in the Delray Station of The Detroit Edison Company



For Highest Operating Efficiency...

WORTHINGTON FOLDED TUBE LAYER SURFACE CONDENSERS

OF WELDED STEEL SHELL CONSTRUCTION

OFFER SPECIAL FEATURES

The girder type shell . . .	→ *Insures rigidity and freedom from vibration*
Liberal steam space above and around the tube banks, and large "cut outs" in support plates . . .	→ *Provide efficient steam distribution within the shell*
A maximum amount of front line tube surface is exposed to incoming steam . . .	→ *Resulting in immediate reduction in steam volume*
Short path for steam travel through tube banks to exit lanes	→ *Reduces losses from pressure drop to a minimum*
Direct air removal through exit lanes to air cooler sections and air offtakes . . .	→ *Reduces the number of tubes over which air liberated by condensation must pass*
Venturi-shaped central steam passage from top to bottom of condenser, and to hot well . . .	→ *Provides steam for reheating and deaerating condensate, and condensate superheating*

Condensers incorporating these features and equipped with Worthington auxiliaries are establishing unexcelled records of efficiency and continuity of service.

CND-1

WORTHINGTON PUMP AND MACHINERY CORPORATION
General Offices: **HARRISON, NEW JERSEY** • Offices and Representatives in Principal Cities

LOWER COSTS
Increase WORKMEN'S SAFETY
INSURE SPEED FOR
EMERGENCIES

HIGHWAY
Mechanized
POWER LINE CONSTRUCTION
AND MAINTENANCE
EQUIPMENT

HIGHWAY EARTH
BORING MACHINE

Digs in clay, hardpan, gumbo, shale, or frozen ground—digs anchor holes or holes at any required angle—great capacity—great flexibility—power and strength to operate with the largest of truck and tractor motors—light in weight—compact in construction—a wide variety of types and sizes.

HIGHWAY WINCHES—easier to use—smooth operation under heavy duty—a type for every need.

HIGHWAY POLE AND CABLE REEL TRAILERS. A wide line of pole trailer and combination pole and cable reel trailers to economically meet all needs.

HIGHWAY "CABLE SPLICER" TRAILERS. A splicer's workshop on wheels—weatherproof—thiefproof, and fireproof.

HIGHWAY ACCESSORIES. Drawbars, Towing Hooks, Automotive Pintle Hooks, Pay Out Reels, Collapsible Power Reels.

HIGHWAY BODIES. Ample roominess, comfort for crew, convenient in arrangement, lightweight yet rugged, save money over longest periods.

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HIGHWAY TRAILER CO.
EDGERTON WISCONSIN

General Electric Co., with headquarters at Nela Park, Cleveland. During the last two years of his association with G.E. he was also sales manager of the radio, laundry and household appliance divisions, with headquarters at Bridgeport, Conn. His broad experience in sales organization and merchandising and promotional work eminently qualify him for his new position as vice-president and treasurer of the Detroit agency and head of its merchandising department.

OBITUARY

▶EDWARD T. HUGHES, manager of the Kansas Electric Power Co., Parsons, Kan., died May 4, following an extended illness.

▶MALCOLM G. BUTNER, manager of the North Wilkesboro district of the Duke Power Co., was killed in an automobile accident April 26 while returning to North Wilkesboro from a sales conference in Charlotte. Mr. Butner was 42 years of age and had been a member of the Duke Power organization for more than 20 years.

▶BENJAMIN J. PEARMAN of Anderson, S. C., a member of the state Public Service Commission since 1931, died at a hospital in Columbia on February 7. He was commission chairman in 1936 and had just been re-elected for his fifth consecutive two-year term. He was 58 years old.

▶JEAN FALLOU, chief engineer of the Societe de L'Union d'Electricite, Paris, France, died recently in that city at the age of 41. Mr. Fallou was professor of electrotechnics at the Ecole Superieure d'Electricite. He has taken a prominent part in the development of the transmission of high voltage electric power to the Paris area in recent years.

▶WALTER A. SUTPHEN, a member of the power sales engineering staff of the New England Power Service Co., died suddenly at Lancaster, Mass., April 17. He was well known in New England utility circles and was at one time district power sales engineer for the Worcester area. For a time he was associated with Francis J. Sill, consulting engineer, Westboro, Mass.

▶WILLIAM T. RYAN, professor of electric power engineering since 1922 at the University of Minnesota, died February 5, in his fifty-seventh year. Before entering upon his academic career in 1907, Professor Ryan had been connected with Westinghouse Electric & Manufacturing Co. and the General Electric Co. He was active in the committee work of the American Institute of Electrical Engineers and had served as a vice-president.

At the close of our tenth year of business history, we look back over the past with a feeling of justifiable pride, with a deep appreciation for the loyalty of our many friends and customers.

We believe our record of consistent progress is due in no small part to the dependability of our product and the reliability of our service, backed by pioneering research and development based on sound engineering principles.

It is our hope that we may continue to serve you in the years to come even more efficiently than in the past, with a product built to fit your individual requirements!

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Representatives in principal cities

Our latest Bulletin 391 will be sent on request

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Advancement Without Safety is WORTHLESS!

Doble Means Safety

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- In over 18 years of electrical insulation testing in the field no Doble user has been killed or injured or caused any electrical accident.
- Many million safe electrical tests have been made employing the Doble technique.
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1922 casualty rate
$18.00 per hundred.

Present rate
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with
new equipment for testing the largest transformers, generators and cables in complete safety.

DOBLE ENGINEERING COMPANY
Insulation Testing Experts
MEDFORD HILLSIDE BOSTON, MASS.

ton as assistant commissioner. The personnel changes in the Bureau of Reclamation, resulting from the prospect of early commencement of work on the Friant Dam, were announced by Secretary of the Interior Harold L. Ickes.

▶EDWIN J. SCHWANHAUSSER has been elected a vice-president of the Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Schwanhausser has been connected with Worthington since 1915 and has been works manager at Buffalo, N. Y., since 1929. As vice-president and works manager he will continue in his present responsibilities.

▶EARLE S. THOMPSON, president and director of the American Water Works & Electric Co., Inc., has been elected a director of the City Bank Farmers Trust Co., New York.

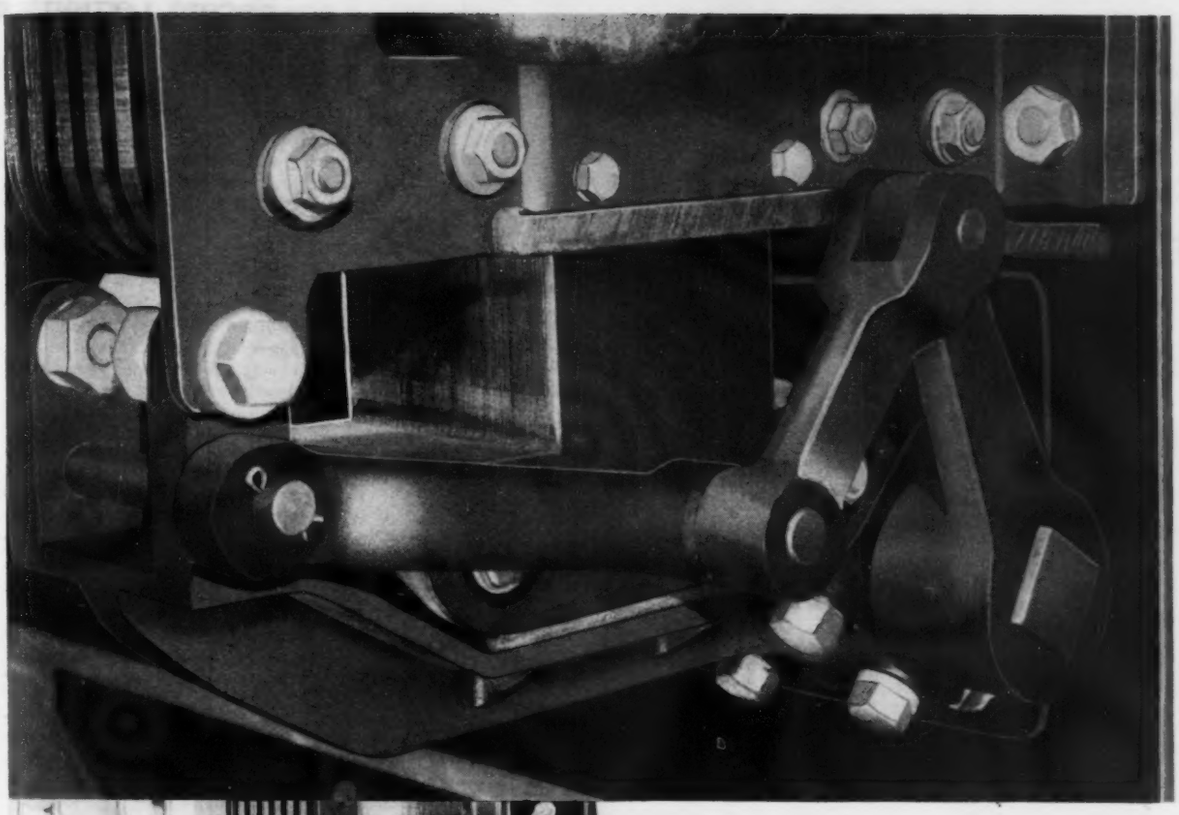
▶JAMES CHRISTENSEN, formerly with the Wisconsin Hydro-Electric Co. at New Richmond, Wis., has been appointed district manager with headquarters at Amery.

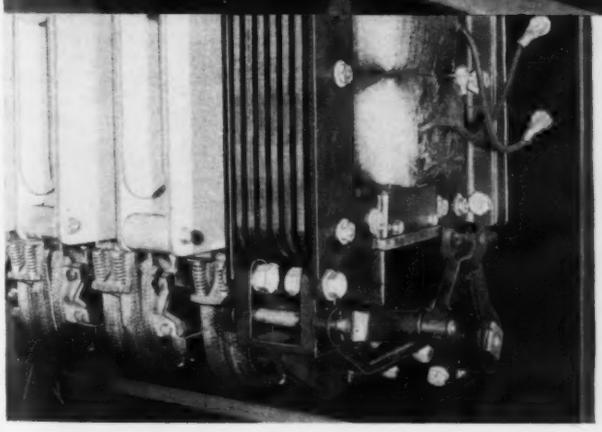
▶ROBERT HELD, for three years manager of the Puget Sound Power & Light Co. at Leavenworth, Wash., has been transferred to the Seattle district. CLIFFE FOSSE, for the past sixteen years with the Puget Sound company at Everett, has been appointed to succeed Mr. Held at Leavenworth.

▶N. H. CALLARD, for the past eleven years Pacific Coast district manager of the central station department of Westinghouse Electric & Manufacturing Co., has been transferred to Pittsburgh as a member of the executive staff of Ralph Kelly, vice-president in charge of sales. Mr. Callard has been active in various industry organizations, including the Pacific Coast Electrical Association and the American Institute of Electrical Engineers.

▶JOHN SIGGINS, JR., of Warren, Pa., who failed several weeks ago to win the necessary votes for confirmation as a member of the state Public Utility Commission, has now been confirmed by the Senate. He was appointed by Gov. Arthur H. James to succeed John Sullivan of Broomall. Another vacancy, caused by the resignation of Donald M. Livingston several months ago, still exists on the commission.

▶PAUL B. ZIMMERMAN has resigned as assistant to the president of the Norge division of Borg-Warner Corp., to enter the advertising agency business as a partner in the firm of Grace & Bement, Inc., with headquarters in Detroit. Prior to joining the Norge division of Borg-Warner as vice-president in charge of sales in 1937, Mr. Zimmerman had been for ten years successively sales manager and manager of the refrigeration department of the





MASSIVE

THE NEW 600 AND 1200 AMP. MONITOR CONTACTORS.

NOTE the substantial malleable iron linkage which makes up the toggle mechanism. This linkage transmits the motion of the vertical solenoid plunger to the square bronze shaft on which the contact arms are mounted. The toggle is so arranged that maximum contact pressure when closed and maximum speed of contact opening are both realized.

This mechanism is the same on both the new 1200 ampere contactor and its little brother, the new 600 ampere contactor. Remember—**a good installation deserves Monitor Control,** and Monitor Control is now available up to 1200 amperes.

Monitor
The Original "JUST PRESS A BUTTON" System

Monitor makes the best in standard and custom built motor control up to and including 1200 Amperes.

MONITOR CONTROLLER CO.
Gay, Lombard & Frederick Sts. Baltimore, Md.

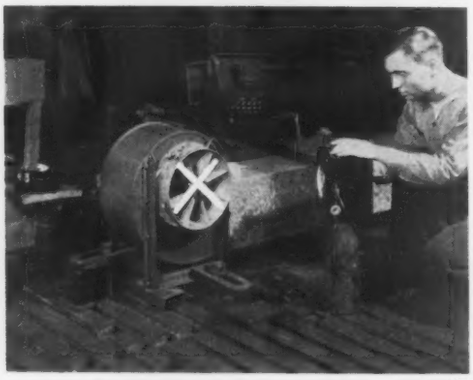
Monitor UP TO 1200 Amperes Controllers

X marks the Spot

Located by the STROBOTAC

Wear and power losses caused by

see for yourself



Torque irregularities
Speed Variations
Improper Tension
Decreased Clearances
Lack of Synchronism
Shaft Distortions
Coupling Slippage
Loose Set Screws

● and scores of other mechanical deficiencies while your equipment is operating *at normal speed.*

The STROBOTAC enables you to detect damage while it is being done. You don't have to guess at the causes . . . you see mechanical hazards at work.

Hundreds of research, production, maintenance and sales engineers have saved themselves significant sums of money with the STROBOTAC . . . and are stepping up profits with this simple, accurate, easily operated device. The STROBOTAC with its controlled flashing beam of light stops motion from 600 to *100,000* r.p.m. Its large illuminated scale on the speed control is calibrated directly in r.p.m. from 600 to 14,400. It requires no mechanical or electrical connection to the equipment under observation.

If you have any problem involving the observation of motion, the STROBOTAC is a simple, accurate, portable and easily operated tool for securing the answer.

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GENERAL RADIO COMPANY
CAMBRIDGE, MASSACHUSETTS
Branches in . . New York and Los Angeles

Recent Legislation

Action has been taken by the various state legislatures on bills which affect the light and power industry.

NEW MEXICO—Before adjourning the Legislature defeated two regulatory measures covering distribution of electricity, gas and water by both privately and municipally owned plants. A bill to repeal the Session Laws of 1921 preventing firms from competing with established utilities in the smaller communities unless a certificate showing necessity of convenience could be obtained was also defeated. As already announced in ELECTRICAL WORLD, a law was enacted to conform with federal REA regulations pertaining to communities of less than 2,500 population. This will permit REA projects to serve areas already served by established utilities. A bill providing for annual inspection of all electric, gas and water meters at a change of 50 cents per meter was defeated.

NEW YORK—The Assembly ways and means committee has killed the Crews bill to create the New York City Power Authority.

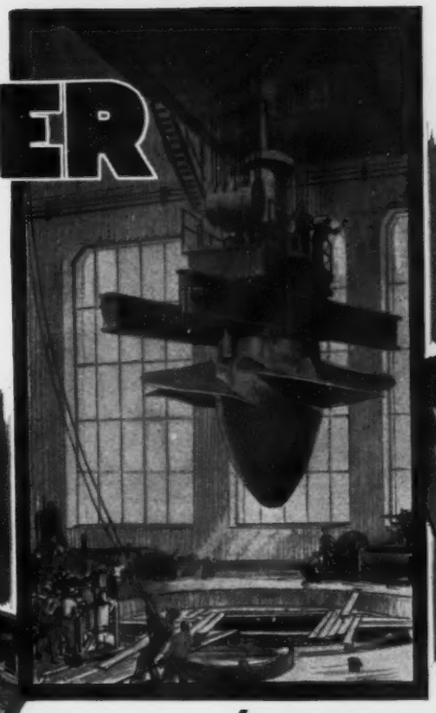
PENNSYLVANIA—A bill to prevent cooperative associations from constructing rural electrification lines in territory where a public utility serves or "stands ready" to serve customers was introduced in the Senate. Another measure introduced in the Senate would set up a public utility commission fund in the state treasury to hold all assessments on utilities for expenses of the commission salaries and expenses of the commissioners and employees to be paid from the fund directly. Another measure introduced in the House provides for the appointment of county and city inspectors of public service company meters. The inspectors would test the accuracy of electric meters furnished by public utility companies for the purpose of measuring their service to the consumer in conformity with the laws.

WISCONSIN—A bill placing a license fee of 3 per cent of gross receipts on electric co-operatives was unanimously passed by the Assembly and sent to the Senate for action. The Secretary of State would appropriate 15 per cent of the revenue to the counties on the basis of the ratio of co-operatively owned lines in the county to the total lines in the state. The remainder would be appropriated among the local tax districts on the same basis. Members of the Wisconsin Public Service Commission would be prohibited from owning utility stocks or bonds or having an interest in any enterprise affected by a commission order under terms of the Bichler bill introduced in the Assembly.

FLORIDA—Legislature has sent to Governor Cone a bill to facilitate the formation of co-operatives for supplying electricity to farmers. Changing its mind, the House agreed with the Senate that no limitation should be placed on the areas which the co-operatives may enter. The measure, sponsored by the Federal Rural Electrification Administration, provides only that the co-operatives should not compete directly with private or municipal utilities. The Governor signed new laws setting up a board to regulate electric and gas rates in Tampa, authorizing Mayor R. E. L. Chancey to appoint the first membmers of this board and abolishing the present utilities regulations in the West Coast city.

MICHIGAN—House has passed and sent to the Senate the Smith-Stanley bill amending the state's sales tax act, which, if finally enacted, will bring Michigan

POWER



by SMITH for UTILITIES

PROFIT by Bulletins resulting from more than 60 years of hydraulic experience. They're replete with engineering data, tables, charts, diagrams, drawings and methods—crammed full of information vitally important to utility men—especially during times like these! You can't help but be benefited by the wealth of knowledge these books contain. Take a moment to send for them.

Bulletin No. 139: KAPLAN TURBINES.

Bulletin No. 132: "POWER by SMITH" for medium sized developments.

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Bulletin No. 138: IMPULSE TURBINES.

Bulletin No. 140: ROTOVALVES—A 96-page Text Book on Cone Valves, their controls and applications.

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we must have top quality porcelain"

. . . . ."Well, sir, the answer then is

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Every Illinois porcelain product has quality that extends from end to end —in design, in the materials used, and because of the modern Illinois manufacturing which insures—balanced interior stress—homogenity of structure—high dielectric strength—permanence of glaze—and exact dimensions. Write to Illinois for your immediate requirements.

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ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

users of municipal electric service under provisions of the act by providing for payment of the 3 per cent sales levy on all municipal electric bills.

RHODE ISLAND—Legislature has passed a measure increasing from 1 per cent to 1½ per cent the tax on gross earnings of electric utilities. The Legislature has adjourned until January.

SOUTH CAROLINA — General Assembly has ratified a rural electrification co-operative act. Drafted along the lines recommended by the national authority, the act would permit five or more persons to organize a rural electric co-operative, which would have the authority to borrow funds direct from Washington for power line construction in the area which it proposed to serve. Any such co-operative would be independent of the state rural electrification authority.

•

Recent Rate Changes

CENTRAL NEW YORK POWER CORP. has filed rate revisions with the Public Service Commission under which electric consumers will save $117,600 annually. The rates are applicable in the Watertown, Ogdensburg and Malone districts of the company, which include a large number of villages and towns in Jefferson, Lewis, Oneida, St. Lawrence and Franklin counties. Reductions to residential consumers will total $61,500 annually. Net reductions to commercial customers will amount to $58,100 annually. The commercial rate changes will reduce the bills of 4,726 customers a total of $68,650 a year, while the bills of 119 commercial users will be increased a total of $10,550. Of the 119 consumers increased $10,550 the company states that 97 are increased $10,270 because the present billing demands are less than demands if measured or correctly determined by test.

CENTRAL ILLINOIS PUBLIC SERVICE CO. has been directed by the Illinois Commerce Commission to reduce rates to residential electric consumers in 55 municipalities $115,000 a year. The rates were to be effective June 1. The reduction centers in a slash in the top block of residential rates of these cities from 7½ to 6½ cents per kilowatt-hour.

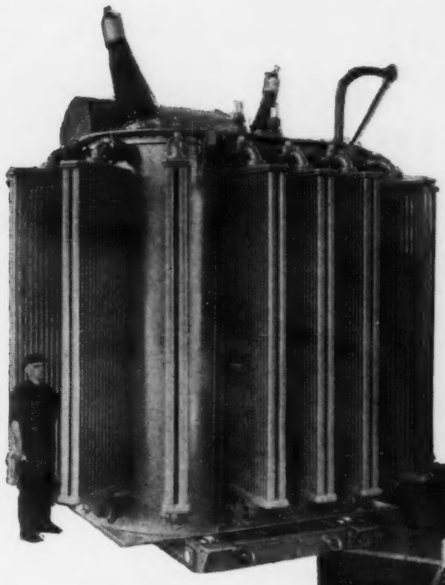
ALABAMA PUBLIC SERVICE COMMISSION has announced that approximately 26,000 urban residential customers of the Alabama Power Co. will have their bills figured on the "objective rate," with a resultant saving to them of approximately $100,000 annually. The change became effective May 1. All of the other 94,500 urban residential customers of the company are now receiving the objective rate introduced by the commission in 1933.

FREEPORT, L. I., has filed with the New York Public Service Commission a new rate schedule which will save non-residential customers of the municipal electric plant $25,000 a year.

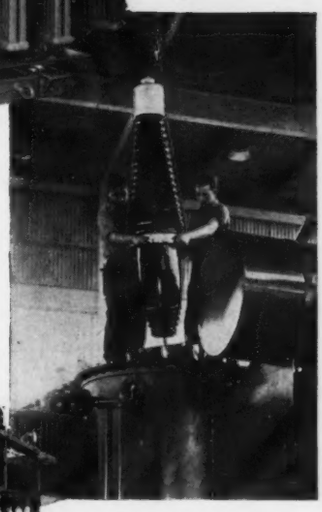
JACKSONVILLE, FLA., city commission has announced rate reductions in each of its commercial lighting and power rate schedules to become effective with July meter readings. Savings to consumers on the commercial lighting rate run from $1 to the user of 300 kw. to $38 to the user of 5,000 kw. and on the commercial power rate the savings run from $1.25 for the user of at least 1,500 kw. to $76.25 a month on the use of 10,000 kw.

MOUNTAIN STATES POWER CO. has reduced its residential rates, effective June 1, by $38,000 annually in its Willamette

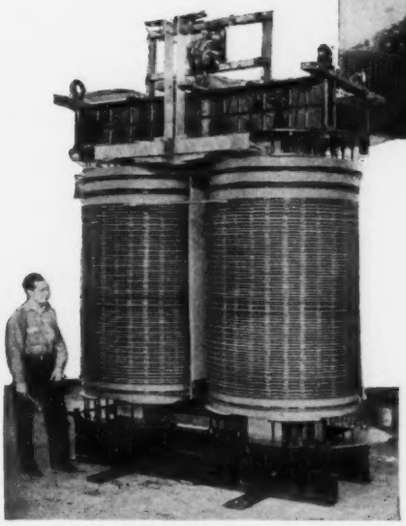
ACCEPTED



Above: AmerTran Type CC power transformer, 10,000 Kva, single phase, 60 cycle, 125 Kv. service.



Above: Mounting a high-voltage, oil-filled bushing in the tank of a large power transformer at AmerTran's factory.



Core-and-coil assembly of the large AmerTran power transformer illustrated above.

by industry in all ratings and sizes

Behind transformers bearing the circular AmerTran trade-mark is an organization with thirty-eight years' experience in this specialized field. Transformers in a complete range of ratings* are manufactured for every conceivable type of service in industrial and laboratory work. Many of this country's largest electric utility companies and leading industrials are numbered among the hundreds of customers who have been purchasing our products year after year. Let us submit complete data to cover your transformer requirements.

*10,000 Kva. and smaller at 132 Kv. and below.

AMERTRAN

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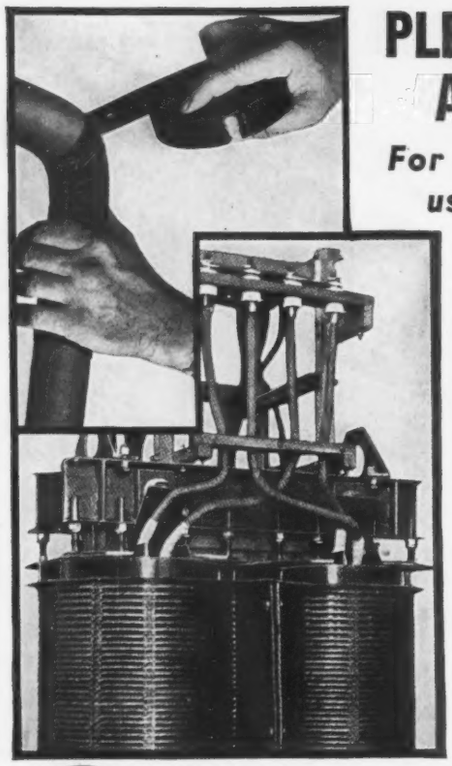

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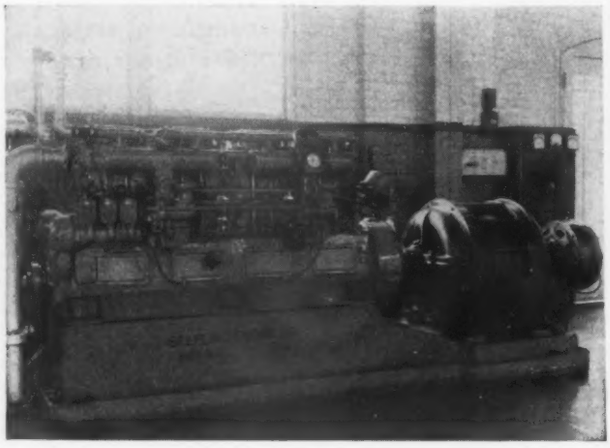

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Valley division and $6,000 in the Tillamook division. The new schedules reduce the top rate from 7 cents to 5½ cents in the Willamette Valley division and from 7 to 6 cents in the Tillamook division.

KANSAS CITY POWER & LIGHT CO. has reduced its rates to several retail and wholesale establishments in the downtown area, effecting a saving for these customers of approximately $45,000 a year. The new rates were filed with the commission on May 11, to become effective thirty days later.

•

Municipal Plants

YORK, NEB.—City Attorney Calvin Webster has received authority from the City Council to prepare an appeal from the recent decision of Federal Judge Munger at Lincoln holding that the Iowa-Nebraska Light & Power Co. has a permanent franchise in York. Judge Munger dismissed the city's petition, which asked that the company's lines be removed from streets and alleys. Another suit, in which the power company attacks the legality of the election held authorizing issuance of bonds to buy a municipal plant, is pending in federal court.

CAMDEN, TENN.—Voters have approved a bond issue of $180,000 to provide funds for purchase of the electric distribution system or, if unable to purchase, to construct such a system.

TEMPLE, TEX.—City commission has called an election for June 2 to decide whether the city wants a municipally operated power plant and street lighting system. Under the proposed plan bonds of $850,000 would be voted to mature over a period not to exceed 20 years and would carry an interest rate of 4 per cent.

BUENA VISTA, VA.—The special committee appointed to investigate the advisability of erecting and operating a municipally owned electric power plant reported at a recent meeting of the Council that after careful consideration it was deemed inadvisable to erect such a plant. This decision was reached, the report stated, because the cost of erecting an electric generating plant which would take care of the large and irregular power and domestic load required to compete with rates and service furnished by the Virginia Public Service Co. would be too great. Virginia Public Service Co. gave the committee full co-operation in investigating the matter, it was said, and offered a new and much lower rate for street lighting and municipally owned buildings.

•

Plan New Power Station

The North-West Midlands Joint Electricity Authority is contemplating the construction of a new generating station adjacent to the sewage works at Strongford and to use the sewage effluent for condensing water, according to the *Electrical Review*. It is proposed to have two 30,000-kw. units as the initial installation, to be extended later to 120,000 kw. F. Favell, chief engineer and manager of the J.E.A., declared that the station may operate at an annual load factor of 55 per cent with a maximum demand of 57,000 kw.

Better 10KV Potheads

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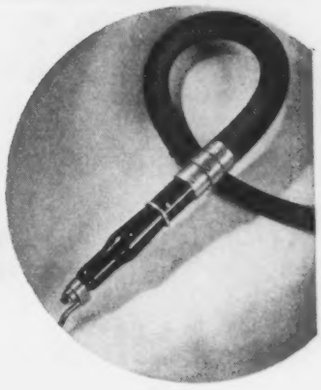

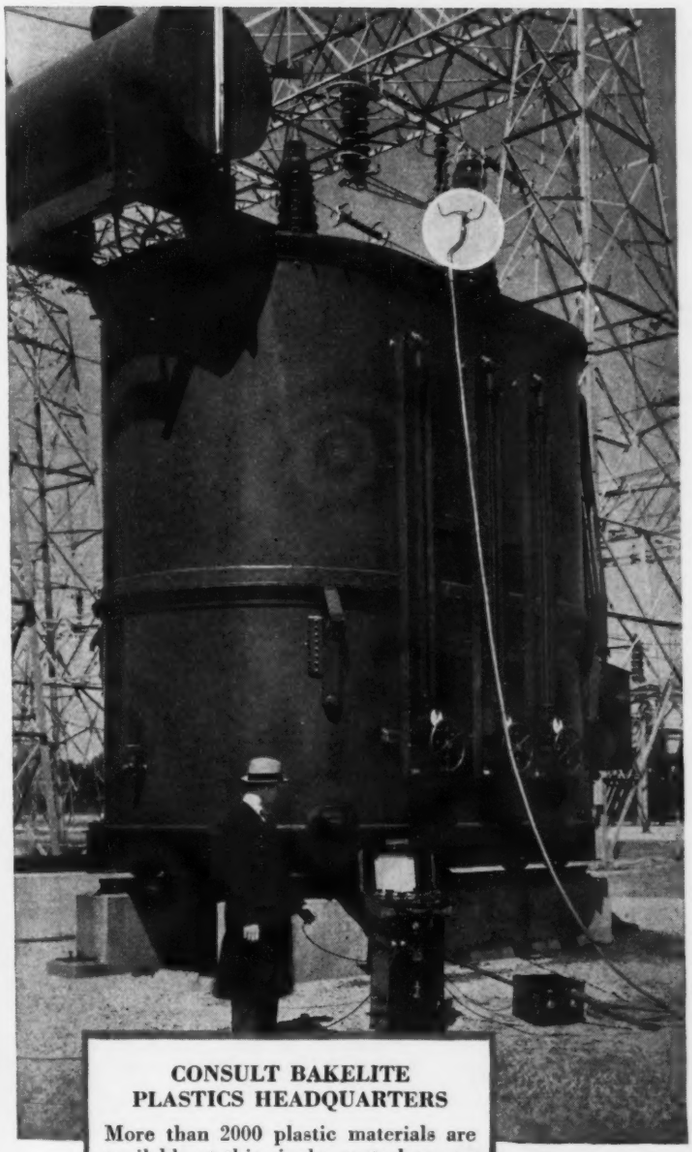

POTHEADS used as connecting terminals on double-shielded 10KV test cables present a tough job for any insulating material! They require unusual mechanical, as well as high electrical performance.

At Bakelite Plastics Headquarters, the Doble Engineering Company found a plastic material highly suited to this task. Their Bakelite Molded pothead, pictured, has proved far superior to all preceding models made from other materials... and it costs notably less to produce!

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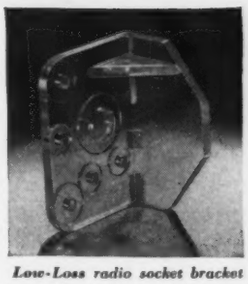

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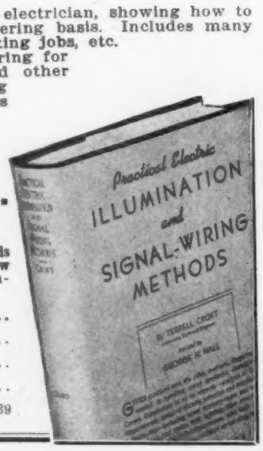

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Sales Opportunities

CLEVELAND, OHIO—Department of Light and Power, City Hall, receives bids until June 9 for equipment for municipal power plant, including one 25,000- and one 12,500-kw. steam turbo-generator units with accessories; also for three high-pressure steam boilers, complete with superheaters, furnaces, draft fans, fuel equipment and auxiliary apparatus. Entire project estimated to cost about $800,000. Peter F. Loftus, Oliver Building, Pittsburgh, Pa., is consulting engineer.

RENSSELAER, IND.—Board of Public Works has approved plans for extensions and improvements in municipal electric power plant and will begin work soon. Cost about $70,000. John W. Moore & Son, Indiana Pythian Building, Indianapolis, are consulting engineers.

MOLINE, ILL.—Deere & Co., manufacturer of agricultural implements, plan installation of motors and controls, conveyors, electric hoists and other equipment in three one-story additions to plants at Moline and East Moline. Cost estimated over $250,000. Proposed to begin work soon.

SMITHVILLE, MO.—Missouri Gas & Electric Co., Lexington, Mo., plans extensions of lines and service facilities at Smithville, where 15-year electric light and power franchise recently was secured.

LOS ANGELES, CALIF.—Department of Water and Power, 207 South Broadway, has preliminary plans under way for new steam-electric generating plant to be operated in conjunction with hydro-electric power transmission system from Boulder Dam. Estimates of cost are being made. Plant is scheduled for completion in 1941. A new hydro-electric power project also is under advisement, to follow construction of steam-electric station noted, with power dam at generating plant at Knight's Crossing, head of Lake Mead; transmission lines will be built for connection with present system. Plans are maturing for four new operating buildings at Department's underground headquarters at 110 South Boylston Street, consisting of a one-story storage and equipment unit, 45 x 110 feet; five-story service and garage structure, 112 x 187 ft.; three-story office, 76 x 112 feet; and minor structure, 30 x 80 ft. Cost of buildings is estimated at close to $500,000, with equipment.

SPOKANE, WASH.—Washington Water Power Co. has plans under way for primary and secondary lines for extensions in rural electric system, including power substation and service facilities. This will be part of 1939 line expansion and replacement program, totaling over 350 miles in two counties, estimated to cost approximately $400,000.

BELLE, W. VA.—E. I. duPont deNemours & Company, Wilmington, Del., plans installation of motors and controls, regulators, compressors, conveyors and other equipment in new addition to branch plant at Belle, to be used for production of ethylene glycol. It is scheduled for completion early in 1940. Cost reported over $500,000.

PENSACOLA, FLA.—Bureau of Yards and Docks, Navy Department, Washington, D. C., plans expansion and improvements in power plant and electrical distribution system at naval air station. Pensacola, estimated to cost about $200,000, including new equipment. Also will install motors and controls, conveyors, regulators, transformers and accessories, and other equip-

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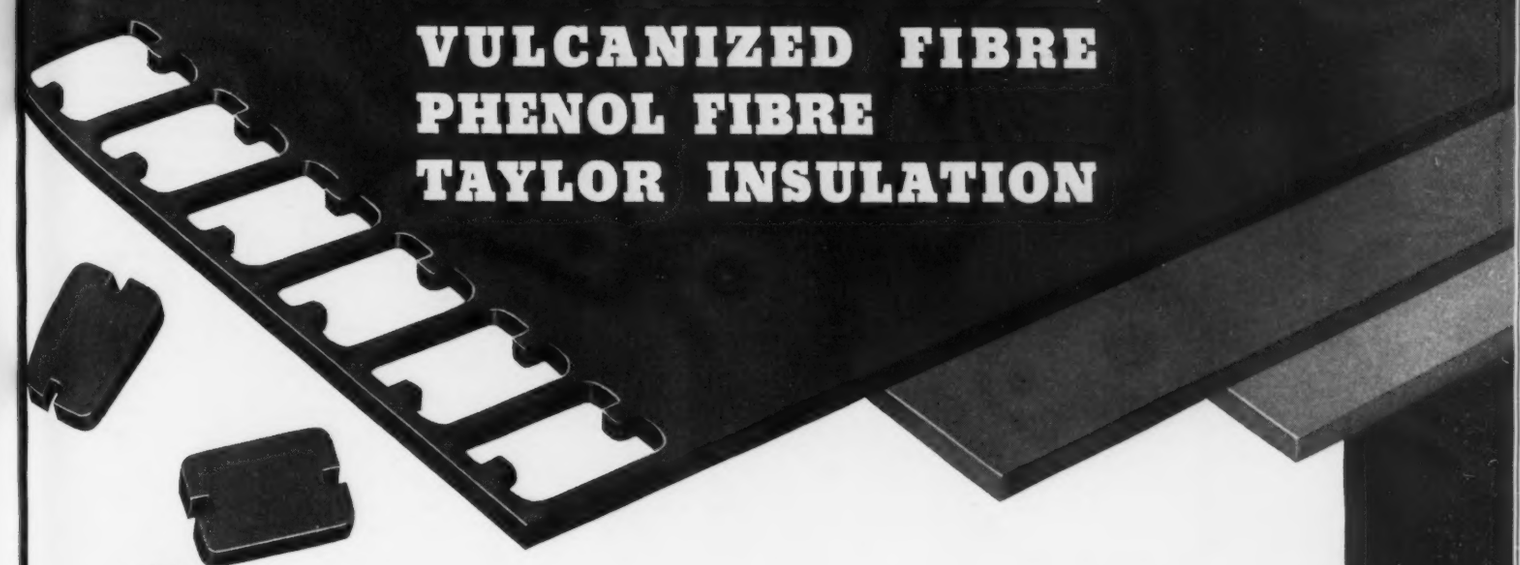

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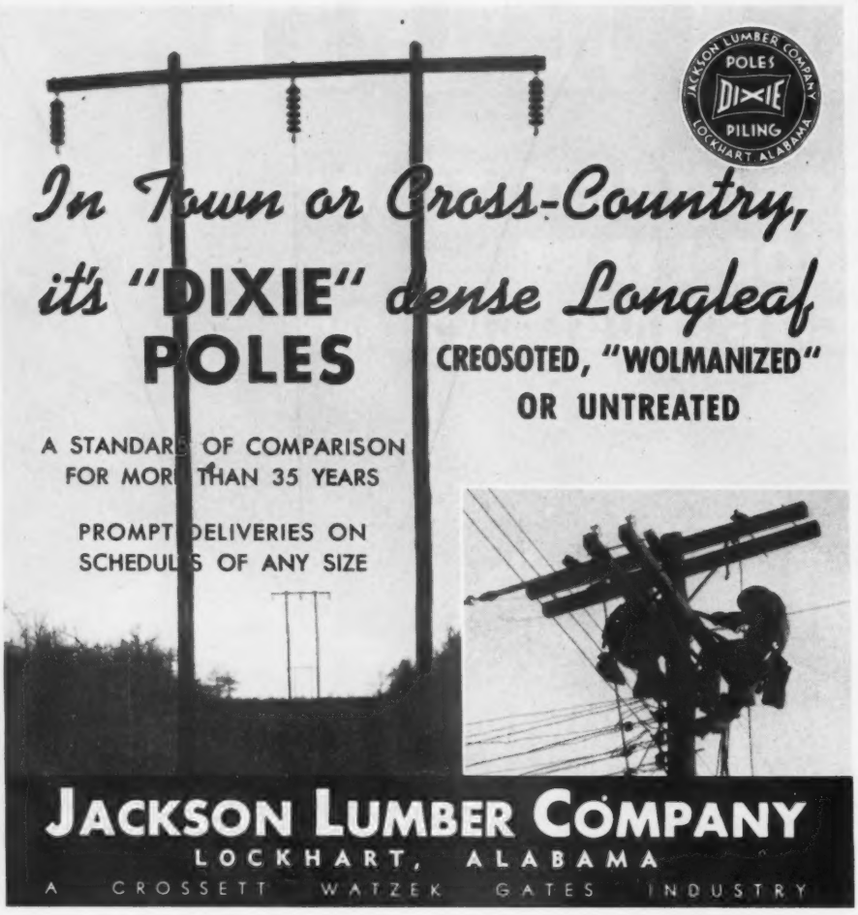

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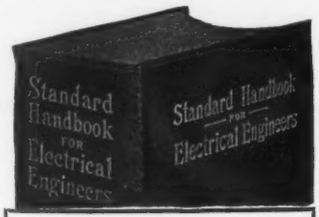

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ment in new aircraft station and other buildings to be constructed at same station. Fund of about $2,500,000 will be made available July 1 for entire project and bids are scheduled to be called closely following.

ROGERS, NEB.—Nebraska Power Co., Omaha, plans extensions in primary and secondary lines in parts of Saunders and Colfax Counties for rural electrification, including service facilities. Application has been made for permission.

TULSA, OKLA.—Mid-Continent Petroleum Corp., Tulsa, plans installation of motors and controls, conveyors, electric pumping machinery, compressors and other equipment in new addition to oil refining plant at West Tulsa, to be used for lubricating oil production. Work will be placed under way at once. Cost estimated close to $750,000.

LAMAR, COLO.—Southeast Colorado Power Association, Lamar, plans extensions in primary and secondary lines for rural electrification, including service facilities. Cost about $533,000 and financing in that amount has been arranged through federal aid.

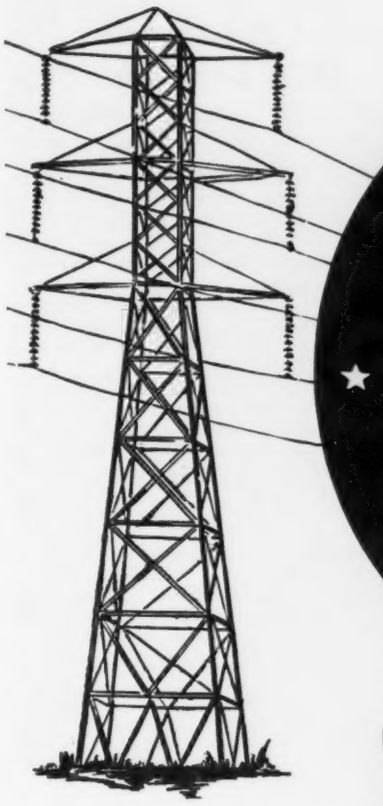
BURKESVILLE, KY.—City Council has plans under way for new municipal electric power plant. Proposed to ask bids in near future. J. S. Watkins, McClelland Building, Lexington, Ky., is consulting engineer.

CAMAS, WASH.—Crown-Willamette Paper Company, a division of Crown Zellerbach Corporation, 343 Sansome Street, San Francisco, Calif., plans installation of motors and controls, conveyors, electric hoists and other equipment in new four-story addition to Camas mill, to be used for expansion in paper bag-manufacturing division and other service. Cost reported over $150,000.

LOS ANGELES, CALIF.—Southern California Edison Co., Los Angeles, has let contract to Stone & Webster Engineering Corporation, Boston, Mass., and 601 West Fifth Street, Los Angeles, for design and construction of proposed new outdoor power substation at Stanton, Orange County, to be known as Barre substation. Equipment installation will include transformers, switchgear, and accessories, with a 70,000-hp. synchronous condenser for regulation of transmission line operation. New station will furnish service for nine 66,000-volt circuits leading from substation to different points in Orange County, where other distribution substations will be located. Award also has been made to same company for new power transmission line from Chino, Calif., present terminus of Boulder Dam power line, to Stanton for service for new Barre substation noted. Entire project will cost about $2,500,000, of which power substation will represent close to $1,500,000.

MINNEAPOLIS, MINN.—Chicago, Rock Island & Pacific Railroad Co., 125 South Third Street, plans installation of motors and controls, conveyors, loaders and other equipment in new local railroad terminal on Fourth Street South, Eighth to Tenth Avenues, consisting of main building, 180 x 540 ft., and several smaller structures. Bids will be asked soon. Cost estimated over $300,000. Main offices at LaSalle Street Station, Chicago, Ill.

PORTLAND, ORE.—Administrator, Bonneville Project, Department of Interior, Portland, receives bids until June 16 for construction of steel towers for transmission line of Bonneville-Grand Coulee, Wash., system, Bonneville Transmission Project.



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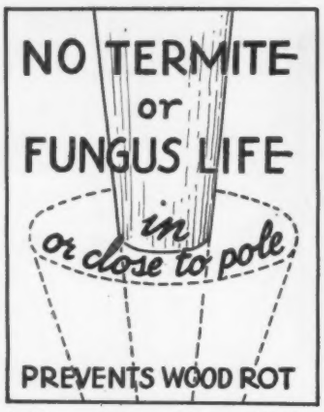

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Recent Allotments; REA Lets Contracts

Among the recent allotments made by the Rural Electrification Administration are the following:

IOWA—Adams County Co-op. Electric Co., Corning, R. E. Phillips, supt., $94,500 to build 78 miles of line, 235 members in Adams, Cass Adair, Montgomery and Taylor counties.

NORTH CAROLINA—City of Greenville, Marvin Swartz, manager, $88,000 to build 110 miles of line, 396 members in Pitt County.

OHIO—Guernsey-Muskingum Electric Co-op., Inc., New Concord, H. B. Smith, supt., $30,000 to complete project and to defray certain expenses which cannot be covered by the construction loan.

FLORIDA—West Florida Co-op. Assn., Graceville, Claude H. Smith, supt., $194,000 to build 262 miles of line, 712 members in Jackson, Washington, Calhoun and Holmes counties.

ILLINOIS—Illinois Rural Electric Co., Winchester, H. G. Bryan, supervisor, $100,000 to construct extensions to connect approximately 1,000 members to the existing lines.

KENTUCKY—Pennyrile Rural Electric Co-op. Corp., Elkton, James T. Warren, supt., $163,000 to build 165 miles of line, 533 members in Todd, Christian, Trigg, Logan and Simpson counties.

MISSISSIPPI—Singing River Electric Power Assn., Lucedale, Ben M. DeShaze, president, $213,000 to build 290 miles of line, 838 members in Jackson, Greene and George counties.

SOUTH CAROLINA—Co-operative being formed, W. T. Bolt, Laurens, Attorney, $224,000 to build 265 miles of line, 839 members in Laurens, Greenville, Spartanburg and Newberry counties.

TEXAS—Deep East Texas Electric Co-op., Inc., San Augustine, D. N. Beasley, supt., $157,000 to build 181 miles of line, 652 members in San Augustine, Shelby, Panola, Sabine, Newton, Nacogdoches and Angeline counties.

WISCONSIN—Dunn County Electric Co-op., Menomonie, M. B. Rotnem, supt., $241,000 to build 248 miles of line, 622 members in Dunn, Pierce, Pepin, Chippewa and Eau Claire counties.

WYOMING—Rural Electric Co., Pine Bluffs, George M. Phillips, president, $234,000 to build 196 miles of line, 364 members in Laramie County, Wyoming, Weld County, Colo., and Banner County, Neb.

Construction contracts:

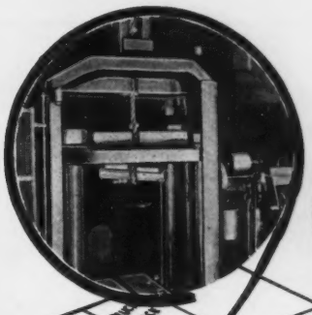
Arkansas Valley Electric Co-operative Corp., Ozark, Wallace M. Milton, supt., and Ray W. Chanaberry, Louisville, Ky., contract to Midland Constructors, Inc., Chicago, another section of project, 169 miles of line, 577 members; bid $117,753.

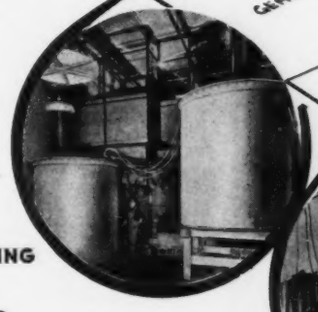
Satilla Rural Electric Membership Corp., Alma, Ga., Valene Bennett, acting superintendent, and M. C. Long, engineer, contract to Gibson and Robinson, Donalsonville, Ga., for building another section of project, 209 miles of line, 552 members; bid $116,745.

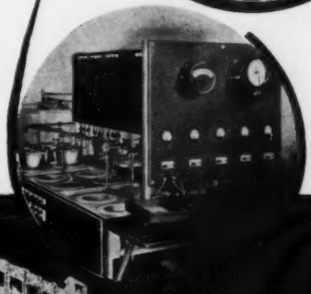
Tri-County Electric Co-op., Inc., Mt. Vernon, Ill., B. H. Tuttle, supt., and A. Y. Taylor and Co., Clayton, Mo., engineer, contract to Langford Electric Co., Minneapolis, Minn., for building entire project, 488 miles of line, 839 members; bid $310,576.

Summer-Cowley Electric Co-op. Assn., Inc., Wellington, Kans., C. L. Weber, supt., contract to Humphreys and Thomp-

MEANS TO AN END







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- Life tests of range units
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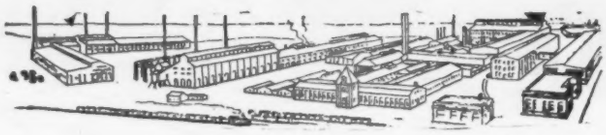

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Maximum protection against the constant attacks of the elements is assured by the double-thick coating of zinc spelter applied by the Oliver Special Hot Galvanizing Process. That is why Oliver has been a standard specification among economy-minded transmission line engineers for more than 40 years . . . why Oliver Pole Line Materials deliver the maximum service per dollar invested.

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APPROVED AND ACCEPTED SINCE 1894
OLIVER

son, Oklahoma City, Okla., for building entire project, 275 miles of line, 503 members; bid $176,213.

Presque Isle County Electric Co-op. Assn., Posen, Mich., Gustav J. Kleber, manager, Southern Michigan Engineering Corp., Lansing, engineer, contract to Cater Construction Co., Kansas City, Mo., for building another section of project, 144 miles of line, 475 members; bid $145,295.

Crow Wing Co-op. Power & Light Co., Brainerd, Minn., H. S. Bliss, engineer, contract to E. W. Wylie, Inc., St. Paul, Minn., for building another section of project, 235 miles of line, 814 members; bid $277,996.

Renville-Sibley Co-op. Power Assn., Fairfax, Minn., Charles E. O'Neill, supt., and Ellerbe & Co., St. Paul, Minn., engineer, contract to Rue Construction Co., Bismarck, N. D., for building entire project, 204 miles of line, 353 members; bid $149,532.

Jones County Electric Power Assn., Laurel, Miss., S. L. Smith, supt., and Francis and Haley, Birmingham, Ala., engineer, contract to Stuart C. Irby, Jackson, Miss., for building entire project, 240 miles of line, 553 members; bid $127,741.

East Mississippi Electric Power Assn., Meridian, Miss., Grady W. Smith, supt., and J. M. Slaughter, Jr., engineer, contracts to Delta Construction Co., Clarksdale, Miss., and W. L. Coston and Sons, Bessemer, Ala., for building first and second scetions of project, 401 miles of line 1,192 members; bid $257,382.

Lewis County Rural Electric Co-op., Monticello, Mo., A. H. Holbert, supt., and Young and Stanley, Inc., Muscatine, Iowa, engineer, contract to Snyder and Johnson, Inc., Mumboldt, Iowa, another section of project, 435 miles of line, 940 members; bid $311,736.

Hamilton County Rural Public Power District, Aurora, Nebr., Arnold Ericksen, supt., H. H. Henningson, Omaha, engineer, contract to Elkhorn Construction Co., Norfolk, for building entire project, 204 miles of line, 335 members: bid $144,762.

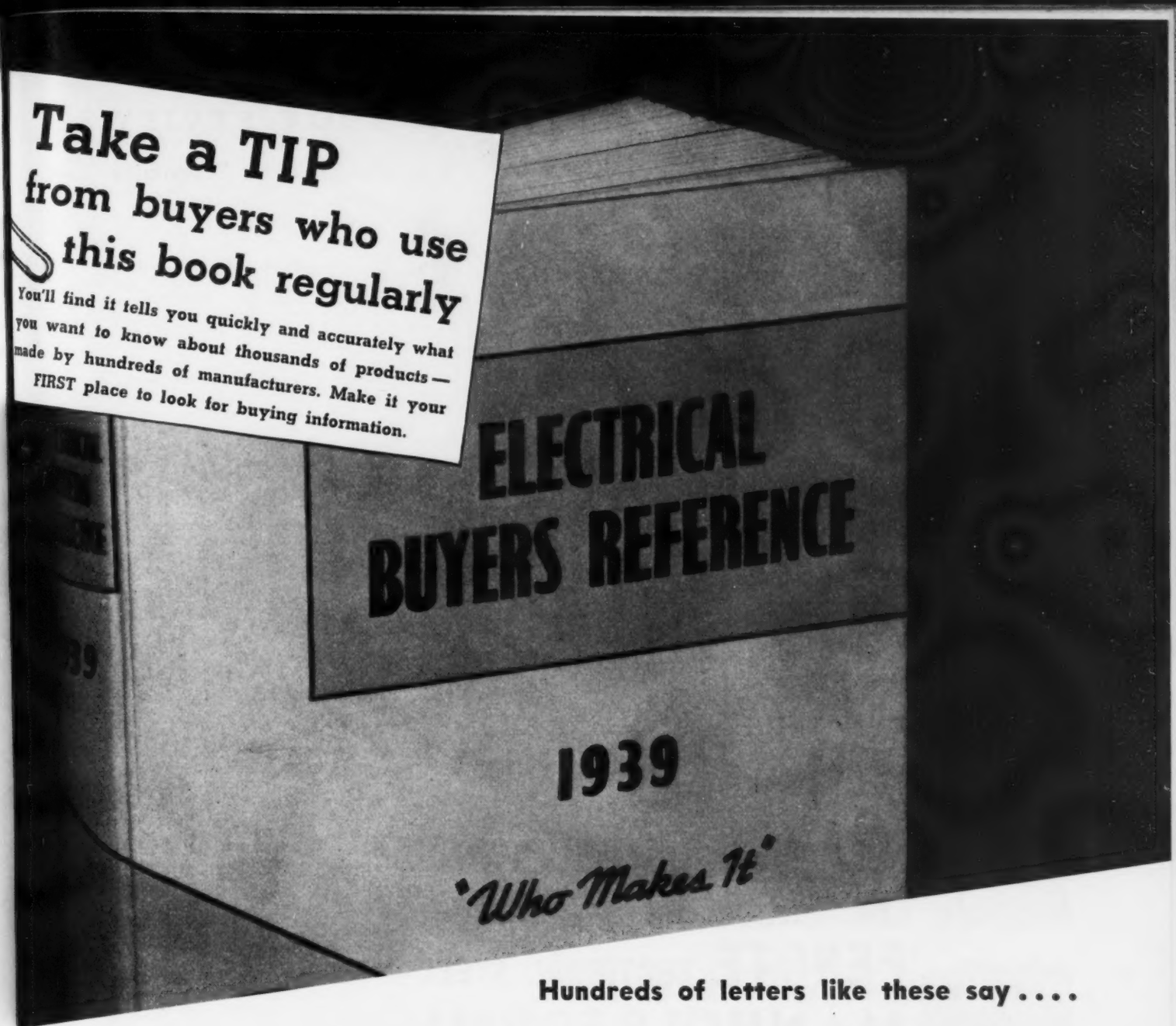
Davidson Mutual Electric Corp., Lexington, N. C., J. L. Litaker, supt., and Gibbs and Hill, New York City, engineer, contract to Bryant Electric Co., High Point, N. C., for building entire project, 281 miles of line, 1,310 members; bid $191,283.

Davie Electric Membership Corp., Mocksville, N. C., J. C. Jones, supt., and B. O. Vannort, Asheboro, N. C., engineer, contract to Sordoni Construction Co., Forty Fort, Pa., building entire project, 203 miles of line, 735 members; bid $148,060.

•

Plans Plant Expansion

Electric Light & Power Supply Corp., Balmain, Sydney, Australia, has awarded a contract to the English Electric Co., Ltd., London, England, for a new 25,000-kw. turbo-generator unit and auxiliary equipment for installation in its Balmain generating station, where expansion will be carried out. The award totals $1,250,000 and is part of the expenditure that company will make for the enlargement. Other contracts are being let for high-pressure boilers and accessory equipment. Completion of plant expansion is scheduled for late in 1940.



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You'll find it tells you quickly and accurately what you want to know about thousands of products—made by hundreds of manufacturers. Make it your FIRST place to look for buying information.

Hundreds of letters like these say....

"We Use It Regularly to Get Buying Information"

Very Helpful in Ordering—"We are satisfied it will be very helpful in ordering electrical material," writes the Manager of a big Sugar Refinery in Michigan.

Answers Questions—"It will be useful for I have many requests from our power customers as to where electrical equipment of various kinds may be obtained," writes Supt. of a large Penna. Power Company.

Answer to Prayer—"It is the answer to the busy Supt. and Purchasing Agents' prayer," writes Supt. of a Utility in Michigan.

Library in Itself—"This book seems to be a small library in itself, filled with useful information to aid us in our purchase of electrical equipment," writes the District Manager of a Light & Power Company in Iowa.

Keeps It on Desk—"I find it a very handy and useful book and am glad to have it on my desk for ready reference," writes Elec. Engineer of Power Co., in Ohio.

Use It Right Along—"We have occasions to use it right along," says a Lighting Manufacturer in Illinois.

"It's of considerable help to us from time to time," writes the Sales Engineer of an Insulated Wire and Cable Co., in Mass.

Of Great Assistance—"We make use of this book right along in our run of work, and find it of great assistance," writes Power & Light Company user from Penna.

Badly Needed—"It came at a time when it was badly needed in our construction plans—we appreciate it very much," writes President of large Power Corp., in California.

More Useful This Year—"We have in the past found this reference book very useful in our office, and feel sure with the improvements which you have made, it will be even more useful this year," writes the Division Engineer of a Texas Power & Light Company.

The heavy mineral pitch base of this sturdy tape makes it highly resistant to all kinds of weather...sun, snow, rain or wind. Highly insulative and adhesive, this natural base tape will be very slow to dry out. A top-quality tape for outside jobs.

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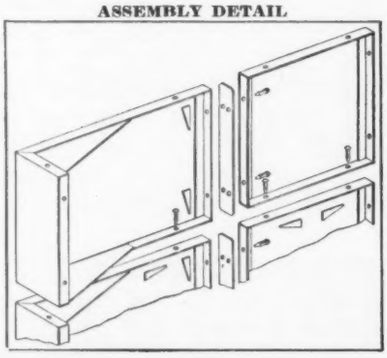

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Penote Forms are equally efficient in rebuilding and in sheathing excavations. Send us a list of your requirements—we'll gladly tell you what is needed—quote you and gladly allow you to try a set of forms on approval—No obligation—Write today.

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BOOK REVIEWS

Power-Factor Economics

By Price L. Rogers. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York, N. Y. 143 pages, illustrated. Price, $3.

Briefly and compactly this book makes clear how gains can be scented and derived from power-factor correction within industrial plants. There is a shorter treatment of public utility distribution systems.

Many readers will attach primary value to the tables of trigonometric functions (especially tangent differences), motor current and power factors (at three loadings), type designations, transformer losses and regulation, corrective capacitances, switch and fuse sizes. There are many charted characteristics of use to the correction engineer and a considerable number of quantitative problems are worked out in full detail to show rate savings, etc.

So as to keep the treatment understandable by the average practical industrial engineer the author has not hesitated to sacrifice a degree of exactness of language, but the end largely justified the means.

•

You and Your Money

By C. Donald Dallas. Published by Prentice-Hall, Inc., 70 Fifth Avenue, New York City. 85 pages, illustrated. Price, $1.50.

Anyone with money to risk in today's dormant American business should be glad to know how one of those to whom such funds are really intrusted judges the bewildering economic panorama and sees hope for security and return. No stilted, academic approach, it is, on the contrary, a practical man's mind-mosaic of the causes which underlie confused politics, labor relations, business and investment—communism, regimentation, fascism, pump priming, CIO all woven into the pattern. Timing of investment (in property, securities, commodities, insurance), analyzed in the light of long-term charts, and the ominous growth of taxation are each accorded chapters that precede the final one philosophizing about the struggle for security. You won't invest blindly after reading this business man's characterization of an America in strange doldrums, but nevertheless consciously, poised for a prosperous destiny.

•

Circuits & Machines in Electrical Engineering

By John O. Kraehenbuehl and Max A. Faucett. Published by John Wiley & Sons, Inc., 601 West 26th Street, New York, N. Y. 691 pages, illustrated. Price, $4.50.

Written primarily as a general text for non-electrical engineering students studying electrical engineering as a secondary subject, this work presents electricity as a general subject, dealing with the general system and developing the specific system as a special case. The authors have made an interesting departure by combining the concepts of alternating current and direct current. By so doing they have attempted to avoid repetition and at the same time free the student of having to study d.c. principles and later modify his point of view in studying a.c. electricity.

In developing the subject stress is placed on physical analysis rather than mathe-

An electrical view of our "World of Today"

• It now costs the average American household only $1.71 to light its house or apartment by electricity for a month (using 40 kilowatt hours). If this home had to use candles, it would have to pay $346.65 a month for an equivalent amount of light... would have to burn 5,778 candles, totaling over a half ton in weight.
$346.65
$1.71

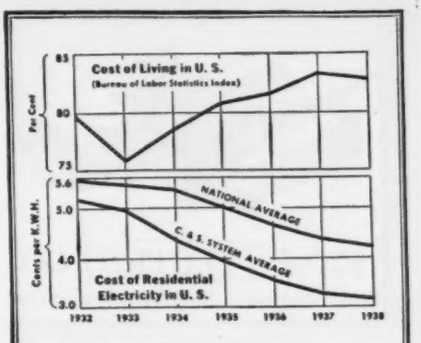
FOR less than a dollar a week the average American city home is lighted by electricity and vacuum-cleaned; its food is refrigerated and it is supplied with ice; its radio is operated, its toast and coffee are made and its electric fan is run in summer.

A single dollar buys all this service. No other dollar in the family budget buys nearly so much.

What has made it possible for this country to enjoy cheap and efficient electric service?

The answer is *private enterprise.* It rewards individual initiative. It encourages inventive genius and efficient operation. It induces investors to supply capital.

Operating as private enterprises, our public utilities for half a century have given American homes and industries progressively *more for their money.* To continue to reduce rates and expand their service, the utilities constantly need to obtain new capital from investors.



• In the territories served by the Commonwealth & Southern system (in the North and in the South) the average householder pays *25% less* for electricity than is paid by the average American home.

• Because of these low rates, the average home in the territories served by the Commonwealth & Southern system now uses a *third* more electric current than the average American home.

UNEMPLOYMENT— It has been estimated that starting now the utilities could spend, within a five year period, five billion dollars *additional* for new equipment . . . if the money could be obtained from investors.

This, alone, would give new, steady jobs at good wages to approximately 400,000 workers, principally in our heavy industries where sustained recovery must be started.

There are about three million people on "work relief" . . . another million and a half on "general relief" . . . in addition, over six million are also looking for steady jobs. Obviously any barriers holding back renewed activity by utilities, or any other American industry, should be quickly removed.

Investors would supply this money, and more, if the Government would define *by agreement* the specific areas where it intends to force the sale of private utilities by subsidized competition. Then, investors will be able to judge which utility properties are to be safe from threats of confiscation.

The Commonwealth & Southern Corporation

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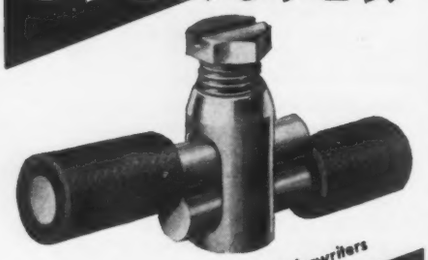

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matical derivation. The material does not develop new or radically different interpretations, but approaches the material from a new method of analysis. Problems have been chosen for the purpose of developing analysis rather than for substitution of numerical data in derivations developed. Electronics, which occupies about 5 per cent of the text, has not been included for its novelty; consideration is given only to fundamentals and the equipment found in use at present. In fact, any specialist may find that his field has been neglected; such special subjects are merely mentioned. It is left for the interested student to pursue the details of such subjects elsewhere.

•

The Revolution in Economics

By Robert S. Hale. Published by Bruce Humphries, Inc., 306 Stuart Street, Boston, Mass. 192 pages. Price, $2.

Essentially this is a satirical but constructively critical analysis of current loose thinking in economics, ending with the moral that utilities and regulatory bodies alike should fix rates so as to generate most profit for both consumer and stockholder. Research, the author feels, should forget delving in the precedents of jurisprudence and experiment with trial rate structures. To reach this endpoint by homely reasoning the author has meanwhile explored the manifold functional, social, political and economic consequences of planting Robinson on one island alone and Friday (preordained inferior) on an adjacent one. He finds thereby the germ of every form of political and economic domination extant or soap-boxed. Riding through all the avenues of approach, however, is the dominant theme of conducting business to make as much marginal gain for the buyer as for the seller and more for both if possible.

•

Application of Tensors to the Analysis of Rotating Electrical Machinery

By Gabriel Kron. Published by the General Electric Review, Schenectady, N. Y. 187 pages, illustrated. Price, $4.50; printing limited.

This book comprises twenty-three installments which appeared during three years in the *General Electric Review*, with unification of symbols and notation which matured during the evolution of the new art of tensor analysis. The virtue of the new tool rests in the ease with which a limited number of variables can be studied in their changes, independently of common factors, as all practicable combinations of brushes, rings and coil connections are modified in transition from a basic machine to a multiplicity of evolved transformations and designs. One is enabled to observe simultaneously the effects of electric, magnetic, dielectric and mechanical manisfestations—something not possible without cumbersome expressions while adhering to conventional mathematics.

Examples are carried out in all but numerical detail for such typical analyses as traveling waves, two-layer winding torques, transient stabilities, differential selsyns, cascaded motors, multi-frequency reactions, synchronous machine acceleration, hunting, interconnected electric and dielectric networks. The list implies the universality which is characteristic of the tensor method applied to machinery analysis.

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NO LONGER are the economic advantages of electric power confined to the large metropolitan cities. Gradually this potent energizing force has reached the towns, and extends to the most remote villages and hamlets of the nation —to lighten labor, brighten homes, save time and otherwise contribute to the comfort and convenience of all our people.

Today, widely available electric power permits industry to do much of its work in the smaller centers of population, away from the congestion of great municipalities. As a result, tenement dwelling workers may abide more cheaply and pleasantly on the countryside, well housed among healthful, satisfying surroundings. . . .

Agricultural sections also have benefited materially through the recent advances in electrical production, distribution and technical achievement. In fact, it has been estimated that there are approximately one hundred and forty present uses for electric power on the farm and even more for rural industries — a definite contribution toward greater versatility in such pursuits.

Columbia System operating units have shown a consistent gain in electric customers, the present total exceeding 350,000. These companies keep pace as well with the nation's growing use of Natural Gas, for the past year having met the needs of more than 1,000,000 commercial, industrial and home consumers.

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PREVENT CURRENT DIVERSION

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STAR METER SEAL

There's no need to tolerate enormous losses through theft of current and meter jumping. Here's a porcelain cap that fits all CS type meters. Once in place, it must be mutilated or destroyed to be removed — a sure trap for the power thief. Millions of dollars are being saved annually by utilities that have installed Star Meter Seals Write to our Meter Seal Dept. for sample and full information.

STAR INSULATING BEADS

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Letters to the Editor

What Period Peaks?

To the Editor of ELECTRICAL WORLD:

I have just finished doing considerable work on the Federal Power Commission's Form 64, which is its 1938 Power System Statement. With one exception, Schedule 13 of this report, in all data covering peaks of power companies the commission has requested the information on a 60-minute basis. As this Federal Power Commission report has to be answered by practically every power company in the country, this probably is one of the best arguments for recommendations to standardize the reporting of peak loads on a 60-minute integrated basis.

I do believe it would be worth while for some accredited group to take the initiative in an attempt to standardize the various reports made by power companies as to what period of time should be reported when peak-load data are collected. Such work is more a problem of those committees more directly concerned with the gathering of statistics than a committee composed of operating engineers. Although we load dispatchers and system operators are interested in standardization, as such figures usually originate with us, I am of the opinion other committees are better set up to carry on such a study.

The National Defense Council is now actively engaged in gathering a great amount of data as to the probable increases in power company load should war be declared in this country. It is interesting that the data they are gathering on peak loads is based on a 30-minute interval. It was necessary for the West Penn Power Company to adjust its figures to estimate the 30-minute peak, and I believe this would be the case with the majority of companies. I believe the 30-minute interval was selected because the system peak data being compiled had to be co-ordinated with the demands of industrial customers. Nevertheless, this report and the report I referred to in the first paragraph show that the government agencies are not consistent.

It probably is of interest that the Public Utility Commission of Pennsylvania gives the power company considerable leeway in reporting company peak data, as it simply asks for the information with the request that we specify whether the data cover an instantaneous peak, or an integrated peak over fifteen minutes, 30 minutes, or 60 minutes. I, personally, do not see how the average power company can report correctly an instantaneous peak unless that power company has a means of bringing to a central point all power station loads and totalizing them, as do, I believe, Consolidated Edison Company of New York and Commonwealth Edison Company of Chicago. Most power companies are not so favorably situated.

I am in favor of the hourly peak as a standard basis of reporting, but probably I am prejudiced because it is on this basis that all records of the West Penn Power Company have been built up for years. However, I am of the opinion that the majority of power companies maintained integrated readings for important lines and electric equipment on an hourly basis, rather than for any other period of time.

W. R. HAMILTON,
Supt. of System Operation
West Penn Power Co.
Pittsburgh, Pa.

[Present lack of uniformity is evident from Table I of the Supplement to ELECTRICAL WORLD of May 6, 1939. Companies were requested to report 30-minute peaks. Of the 122 light and power systems in the United States that reported on this item 58 canceled the time and substituted "60-minute" or "60-minute integrated." In the other direction fourteen reported shorter periods, such as instantaneous or five-minute peaks, so that actually there is no one period on which as many as half the reports agreed.—EDITORS.]

•

Fluorescent Lighting and Air Conditioning

To the Editor of ELECTRICAL WORLD:

Your editorial entitled "Fluorescent Lighting a Supplement, not a Competitor" (March 25, 1939) reminds me of a fundamental that I learned at college many years ago: "Never generalize from a specific—never specify from a generalization." That the fluorescent lamp is a real ally of the air conditioner because it is a "cool" light as contrasted to the "hot" light from an incandescent lamp sounds logical to the layman, but just how true is such a statement?

Ten 30-watt daylight fluorescent lamps produce 10,500 lumens. Two 300-watt incandescent lamps would give 11,820 lumens. The 30-watt fluorescent lamp really consumes 35.5 watts because the auxiliary takes 5.5 watts.

On the basis of ten 30-watt fluorescent and two 300-watt incandescent lamps to give equal foot-candle illumination there would be required 600 watts for incandescent and 355 watts

POWER FOR THE FARM
Electrically!

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Kentucky and West Virginia Power Company, Inc.
Kingsport Utilities, Incorporated
The Ohio Power Company
The Scranton Electric Company
Wheeling Electric Company

MILLIONS of visitors to the New York World's Fair will see the model electrified farm erected by the electric utilities. This exhibit typifies the work that has been done by the electrical industry to bring electricity to the farms.

To visit all the 140,250 rural customers served by the affiliated companies in the American Gas and Electric system would make it necessary to traverse the 15,659 miles of distribution lines that we have constructed. For many years the line crews of the affiliated companies have been busily engaged in extending service to these rural customers. Rural folks receive a service equal to that enjoyed by city dwellers. The rates are the same as those paid by customers in the largest communities. The only difference is that the farmer agrees to take a minimum amount of electricity. Our city customers will commend this policy of low rates for farmers, realizing that an efficient, prosperous countryside is the surest guarantee of busy industry and prosperity in the cities.

AMERICAN GAS AND ELECTRIC SERVICE CORPORATION

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Hot Rolled Copper Rods • Bare and Tinned Strand
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(In Rounds, Flats and Squares)
URC Weatherproof Wire
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ROME-60
ROME CABLE CORP. ROME, N.Y.
That New, Tough, 60% Jacketed, Heavy Duty Portable Cable

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PREVENT GROUNDLINE DECAY the OSMOSE Way!

Metropolitan Edison Co., extends life of partially decayed poles by Osmoplastic groundline treatment. Application is simple as A-B-C.

JUST as a chain is no stronger than its weakest link, a standing pole is no stronger than its strength at the groundline. Osmoplastic Groundline Treatment, applied to poles already in place, extends the pole's service life from 7 to 10 years. Cost of treatment totals only $1 to $2, depending on quantity treated. More than 50 leading utility properties now using Osmoplastic with signal success. For detailed information address

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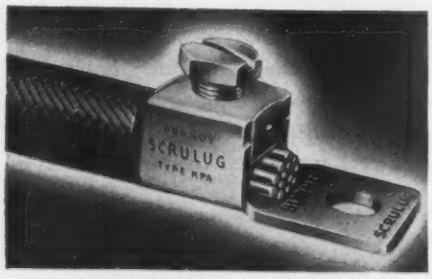

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"ANVIL" BRAND BLOCKS

Linesmen find
"Perfect"
Metal Block
gives best service.

Send for Catalog E.W. covering full line.

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CHICAGO
34 N. Clinton St.

for fluorescent, a difference of 245 watts which will require extra air conditioning. To take care of 3,500 watts of lighting one ton or 1.25 hp. of air conditioning, at an initial cost of $240 per horsepower is required. The cost of air-conditioning equipment to take care of the extra 245 watts of incandescent lamp would be

$$\frac{3{,}500}{245} \times 1.25 \times 240 = \$21$$

The net cost of ten 30-watt fluorescent units with lamps would be $158. The net cost of two 300-watt incandescent units (the best quality) with lamps would be $26, a difference of $132. It would cost more to put in ten outlets for fluorescent lamps than two outlets for incandescent lamps, but we will skip this. It would be economy to spend $21 for air-conditioning equipment, rather than spend an extra $132 to put in fluorescent lamps. Ah! but how about the saving in current? Assuming an eight-hour day 300 days per year and current at 2½ cents per kw.-hr.

The incandescent lighting and the air conditioning for the excess wattage would cost $(0.6 \times 2{,}400 \times 0.025) + (0.087 \times 2{,}400 \times 0.025 \times 7/12)$, or $39 a year for current. The fluorescent lighting would cost $(0.355 \times 2{,}400 \times 0.025)$, or $22 a year to operate. A saving for the fluorescent of $17 a year. But the high cost of lamp replacements for the fluorescent lamps must be paid out of this current saving. The cost of the incandescent lamp replacement is $\frac{(2 \times 2{,}400 \times 0.38)}{750} = \$2.40$. The cost of the fluorescent lamp replacement is $\frac{(10 \times 2{,}400 \times 1.40)}{1500} = \$22.50$ —a difference of $20.10 in favor of the incandescent.

Conclusion: The "cool" fluorescent lighting costs $132 more to install than the "hot" incandescent lighting and it only costs $21 to install the additional air conditioning to take care of the extra heat in the incandescent lighting.

From an operating standpoint the fluorescent lighting saves $17 a year over the incandescent lighting, plus the extra air conditioning, but the lamp replacement for the incandescent lighting will be less by $21.

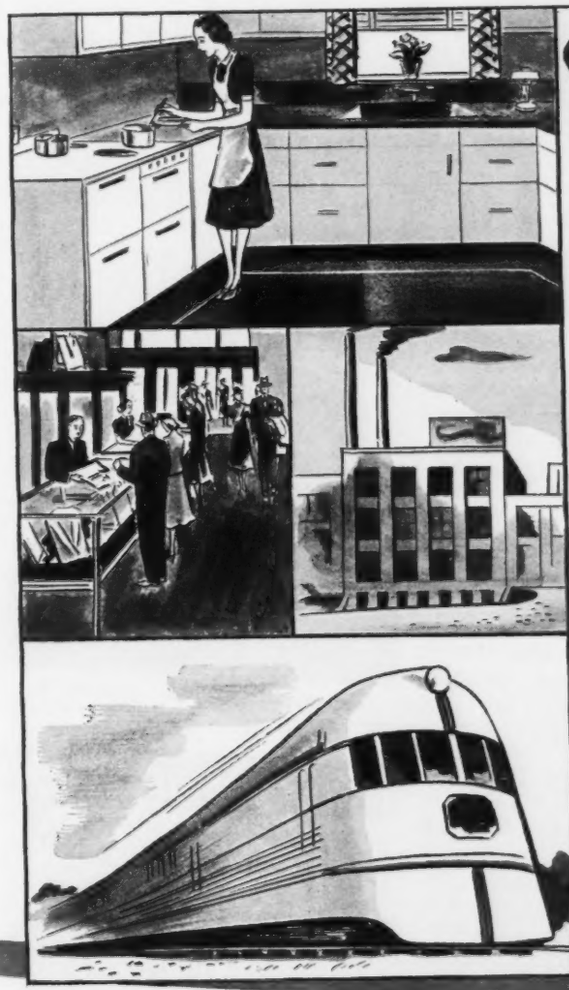
Where is the alliance between fluorescent and the air conditioner? It will cost $111 additional to install the fluorescent and cost $4 additional per year to operate it.

This is just one case. Mr. Sharp in the April 8 issue of ELECTRICAL WORLD discusses the entire subject at length and shows the error of making general statements regarding fluorescent lighting saving money.

DAVIS H. TUCK,
Engineering Department,
Holophane Company, New York.

IN THESE TROUBLOUS TIMES...

The Philadelphia Electric Company employs 6800 men and women. Its yearly payroll amounts to $14,000,000. Indirectly, this company has provided labor for a vast army in furnishing supplies and services, among which was the mining and transporting of almost 1,500,000 tons of coal this past year... In the meantime rates have been decreased consistently. But as the cost of electricity has been lowered, consumption has increased. For instance:



RESIDENTIAL

575,000 homes are served. Average consumption during 1938 was 959 kw. hrs., an increase of 48% over the past five years. Electric refrigeration reached a 57% saturation point. In 1933 it was 30%. Electric ranges are used in 40,500 homes, an increase of 29,700 over 1933. A total of 18,600 homes are equipped with electric water heaters. In 1933 there were only 890 customers using these devices. Over this 5-year period the average residential rate declined 27.6%.

COMMERCIAL AND INDUSTRIAL

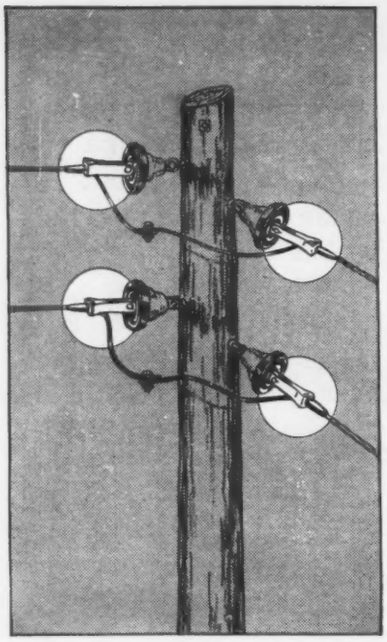
Customers range from the smallest shop to large manufacturing plants and shipyards. In spite of discouraging business conditions, the kilowatt-hour load in these two fields showed a 34% increase over the past five years. A large percentage of this increase resulted from load building activity. At the same time, the average rate has declined 18%.

TRANSPORTATION

About 25% of total electric output is applied towards moving thousands of tons of freight and millions of passengers over the vast electrified traction and railway systems. This business represents a 50% increase since 1933.

PHILADELPHIA ELECTRIC COMPANY

Modernize
YOUR DISTRIBUTION PRACTICE—



Primary dead ending with

Reliable Straight-Thru Dead Ends

● RELIABLE STRAIGHT-THRU DEAD ENDS with rigid clevis make convenient, low cost and high strength connections to disc insulators. The end of the wire can be fed through the unit and used as a jumper—very convenient for pulling slack. The dead end cartridge has same design features and advantages as the standard Reliable Straight-line Splice.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

New School of Technology Plans Research Activity

O. W. Eschbach has been chosen dean of the new school of technology to be established by Northwestern University through the recent endowment of almost $7,000,000. The new school will be of the co-operative type with basic courses in electrical, civil, chemical and mechanical engineering. The first year will be in residence and during the four remaining years the students' time will be divided between industry and college under the supervision of co-ordinators. It is planned to restrict enrollment to 100 carefully selected freshment each year.

A unique feature is the development of a pure research activity with student participation under a research faculty and stress will be given to economics, English, history and sociology as part of the curriculum. New buildings with new laboratories are expected to be completed by the fall of 1941.

•

Debenture Issue Sold

The new issue of $625,000 of five-year 5 per cent convertible debentures of Bendix Home Appliances, Inc., South Bend, Ind., has been sold.

•

Voting Agreement Ended

SEC has ruled that Frank D. Comerford, Sidney St. F. Thaxter and Robert H. Montgomery, trustees under a now terminated agreement under which they held the voting rights of 88.116 per cent of the outstanding common shares of the New England Power Association for the International Hydro-Electric System, were no longer a holding company. The termination of the stock agreement was pursuant to "a plan for disposition of power securities and reorganization of International Paper & Power Co. and International Paper Co."

•

Plant Shows Profit Rise

The municipal electric plant in Hutchinson, Minn., reports for the year ended March 31 net sales of $105,998, as against $85,797 in the preceding year. Net profit on operations, after depreciation, was $48,842, against $41,734, and net income was $39,432, against $31,835. The municipal plant had total sales of 3,848,557 kw.-hr., against 2,621,470 kw.-hr. Domestic customer use averaged 1,002 kw.-hr. at an average rate of 3.47 cents per kw.-hr., according to R. W. Strohmeir, superintendent, in the annual report.

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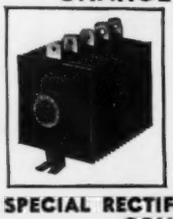

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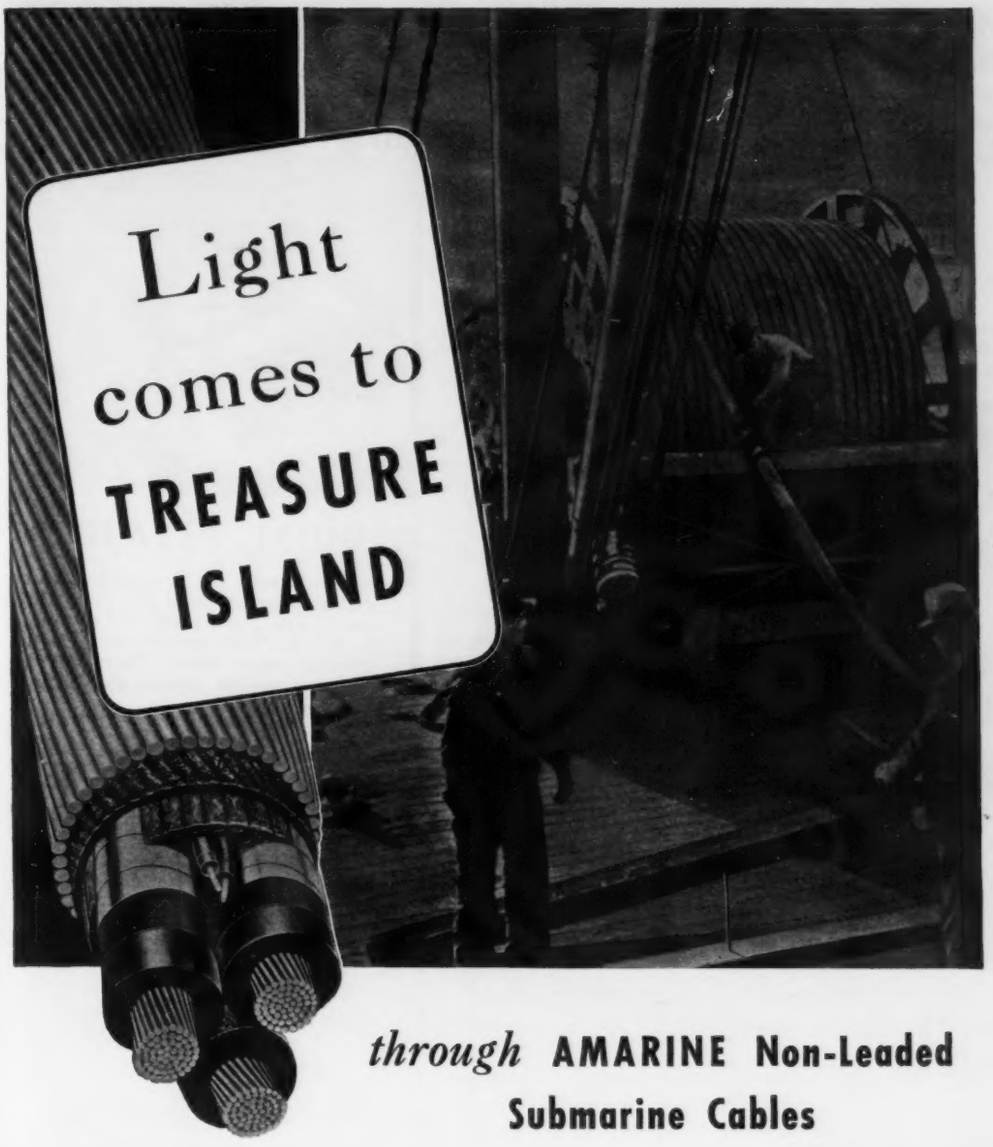


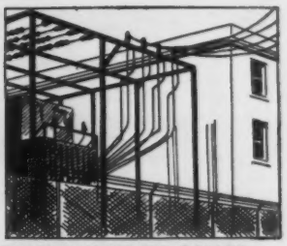
through AMARINE Non-Leaded Submarine Cables

NEW heights in the art of illumination have been attained at the Golden Gate International Exposition. First to be perceived by the visitor, and perhaps last to be forgotten, are the novel lighting effects. These are dependent upon electrical energy—energy carried to the Island by *Amarine* non-leaded submarine cables, laid beneath the waters of San Francisco bay.

Each cable is composed of three stranded copper conductors, insulated with Amarine-40 rubber compound for service at 11,000 volts. Armored with heavily galvanized steel wires, it has an outer diameter of more than 4 inches and weighs 18 pounds per foot. Each conductor of the shore end is shielded with tinned copper tape. A thin layer of semi-conducting material, applied between rubber insulation and copper tape and in intimate contact with both, assures positive and permanent shielding.

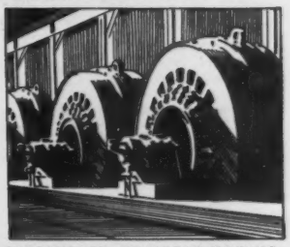
The new cables, installed in 1938, lie not far from two other Amarine non-leaded submarine cables that were installed in the same bay 16 years ago, and which are still in good condition and giving satisfactory service.

ADEQUATE WIRING SERVES AND SAVES



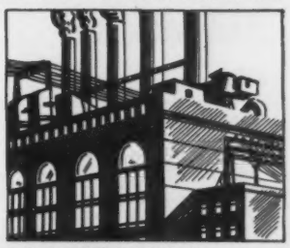
PAPER INSULATED CABLES

AMARINE NETWORK CABLES

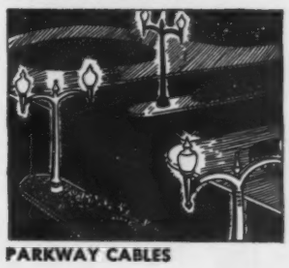


VARNISHED CAMBRIC CABLES

RELIANCE WEATHERPROOF WIRES



AMERBESTOS CABLES



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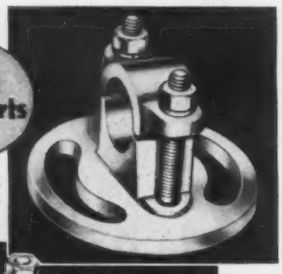

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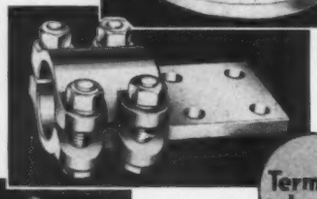

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ERIE, PA.

You'll find it in the *complete* line

PENN-UNION
Conductor Fittings

Seeks Authority to Hold Presidency of Five Units

Finding that it is in the public interest for the applicant to make further showing that neither public nor private interest will be adversely affected by reason of his holding such positions, the FPC has ordered that a public hearing be held on June 5 on the application of Horace P. Liversidge, Philadelphia, to hold the positions of president of five companies—Philadelphia Electric, Philadelphia Electric Power, Susquehanna Power, Susquehanna Electric and Deep Water Light & Power.

•

Get Fellowships at M.I.T.

Among the ten young industrial executives who have been chosen in a nation-wide competition to receive Alfred P. Sloan Foundation fellowships for a year's special program of social and economic study at the Massachusetts Institute of Technology are James H. Campbell, division engineer, Consumers Power Co., Lansing, Mich., and Joseph T. Crosby, Jr., supervisor of construction, Consolidated Edison Co., New York City.

•

Electric Sales Up 3.5%

Total sales of electricity to ultimate consumers by eleven large Illinois electric utilities during March, as compared with the totals for the corresponding month last year, revealed a 3.5 per cent increase in revenue, a 9.6 per cent increase in kilowatt-hours and a 2.3 per cent increase in the number of customers, according to a report issued by the Illinois Commerce Commission.

•

Associated Gas Tax Case

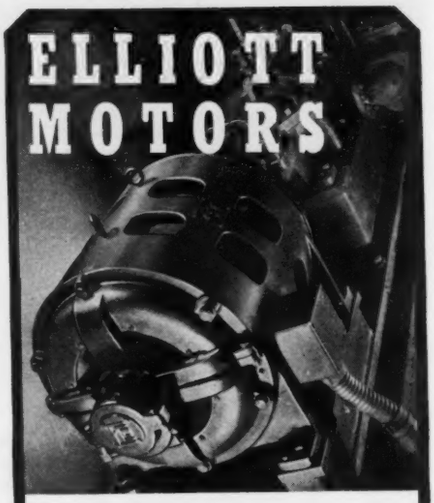
Early agreement is expected in the settlement of the government's $58,000,000 tax claim against Associated Gas & Electric. Notices of the assessments for the years 1927 to 1933, inclusive, aggregating more than $50,000,000, were served on the utility in December, 1935. The company contested the tax claims.

•

Sterilamps on Zephyr

The Burlington's new General Pershing Zephyr, which goes into service between St. Louis and Kansas City this month, has been equipped with "Sterilamps" as part of its air-conditioning unit, the first such application.

ELLIOTT MOTORS



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Connecticut Power Sales

Electric power sales of the four principal utility companies in Connecticut for the month of April, 1939, amounted to 100,889,000 kw.-hr., compared with 86,019,000 kw.-hr. for the similar month of 1938. For the four months ended April sales totaled 416,313,000 kw.-hr., compared with 353,443,000 kw.-hr. in the first four months of 1938. The companies include Connecticut Light & Power, United Illuminating, Hartford Electric Light and Connecticut Power.

•

Appliance Sales Increase

Electric appliance sales were up 11 per cent in Birmingham, Ala., for the first quarter of the year, according to figures on dealer and utility sales recently compiled by the Birmingham Electric Co. Total residential and commercial appliance sales for the three months on the lines of the Birmingham Electric Co. were $697,194, compared with $627,156 for the similar period of 1938.

•

Abitibi Plan Effective

Herbert J. Symington, K. C., chairman of the bondholders' protective committee for the Abitibi Power & Paper Co. first mortgage bonds, has announced that the registration statement for its certificates of deposit is now effective and that copies of the prospectus, together with copies of the plan of procedure adopted by the committee and forms for deposit of bonds, are available for distribution.

•

SEC Extends Stock Plan

The SEC has extended from March 31 to December 31, 1939, the time within which Middle West Corp. can acquire 20,000 shares of $6 cumulative preferred stock of Central Illinois Public Service Co. Middle West had asked the extension since it had acquired only 400 shares under the original period during which the transactions were exempted from provisions of the utility act.

•

Will Pay Insull Dividend

Garfield Charles, referee in bankruptcy, has announced that a payment of 3½ per cent would be made on $50,000,000 of claims of 16,000 debenture holders of the bankrupt Insull Utility Investments, Inc. Payment is to be made early in June from a $2,000,000 fund in the hands of the trustee, Harry A. Bigelow.

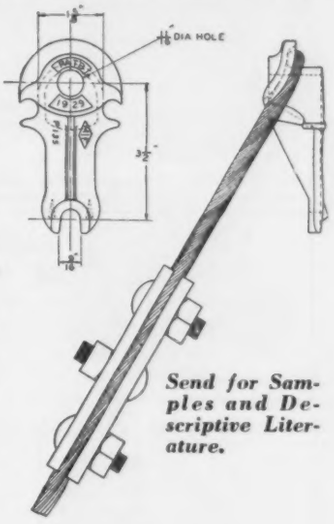
600,000 Installations Can't Be Wrong

M. I. F. Through-bolt Guy Hooks have been installed to this extent since January 1, 1936, in the U. S. and Canada by Operating Companies comprising a majority, expressed in terms of generating capacity or number of meter customers. We would recommend this neat, effective, economic, and hazard-minimizing guying method to those Companies that have not yet tried it. Investigation pays.

Guy Hooks—Three principal types in addition to the P134 Crossarm Guy Hook. P135 rated at 13,000 lbs. on ⅝" through-bolt is also approved for R. E. A. projects. P133 rated at 20,000 lbs. on ¾" through-bolt. P132 rated at 40,000 lbs. on 1" through-bolt. Make up guy loops on the ground and save time of the whole gang. Prices as low as 15c each in quantity.

Eye Nuts and Anchor Rods—Thimbleless Eye Nuts for ⅝" bolt as low as 12c each in quantity. Larger sizes for ¾" and 1" bolts. Double Eye Nuts and various types of Bolt Eyes also available. Also furnished assembled and galvanized as unit on special steel rods of any desired length, rated at 80,000 lbs. per sq. in. at correspondingly attractive prices. These Eyes, used with standard stocks of through-bolts, round out simple specifications for pole-to-pole guys, etc., other than anchor type served by the Guy Hooks

Curved Washers—Full line of Curved Ribbed Malleable Washers using the metal to better advantage than plate washers of uniform thickness, minimizing the pole-splitting stresses of through-bolt guying of any type, and strictly competitive as to price.



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The Long Island Lighting Company's experience with over 35,000 Pfisterized poles has impelled them to Pfisterize their remaining poles. Send for details on how Pfisterizing helps wipe pole maintenance expenses off your profit and loss statement.

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Pfisterizing penetrates right through to the core, thereby preserving the heart wood as well as the surface and retaining the pole's complete strength.

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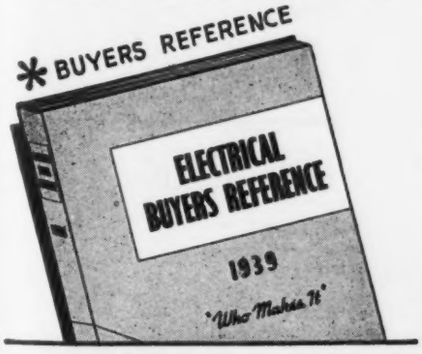

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Copperweld Votes to Increase Shares

Stockholders of the Copperweld Steel Co. at the annual meeting at Glassport, Pa., voted to increase the authorized $5-par value common stock from 600,000 to 900,000 shares and authorized the creation of 50,000 shares of serial preferred stock of $50 par value. Currently there are 431,714 common shares outstanding. The new stock may be issued for future capital needs.

S. E. Bramer, president, said that earnings were excellent in the first quarter of 1939, amounting to $20,236, against $131,458 in the 1938 period. While European disorders and fears of further adverse domestic legislation and mounting debt cannot be ignored, he added, executives should push these matters into the background and turn their attention to the development of their respective businesses.

Directors have declared a quarterly dividend of 20 cents per share on common stock, payable June 10 to stockholders of record June 1. On March 10 the company paid a dividend of 40 cents per share on common which has since been split up two-for-one.

•

Seminoe Dam Telephone Contract Goes to G. E.

Contract for the purchase of telephone apparatus to be used in connection with the Seminoe Dam power plant of the Kendrick project in Wyoming has been awarded by Secretary of the Interior Harold L. Ickes. The amount of the contract was $69,184 and the successful bidder was the General Electric Co.

Equipment will be installed in the power plant and at Rawlins, Casper, Guernsey, Cheyenne and Laramie, Wyo., and at Gering, Neb., and Greeley, Colo., where substations of the transmission lines will be operated. The contractor is allowed from 30 to 90 days to deliver various pieces of the equipment.

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Chicago Air Unit Sales

Contracts for 42 central-plant air-conditioning systems, with a combined capacity of 672 hp., were made in Chicago in April, Commonwealth Edison Co. reports. This compares with 51 systems, having an aggregate rating of 793 hp., sold in April, 1938.

Sales of electric room coolers showed a decided upward spurt in April in Chicago. Electrical dealers and contractors sold 46 units, compared with 21 in April, 1938.

KLEIN "Lightweight" CLIMBERS

Klein "Lightweight" Climbers are built to the minimum weight possible consistent with maximum safety. Every pair is tested exactly the same as are the old time tried Standard Climbers. The lineman can throw his weight on these climbers with confidence—they are Klein's!

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ **Lightweight Climbers.**
- ☐ **Specifications on Linemen's Belts and Safety Straps.**
- ☐ **Klein Kord Fabric Safety Straps.**
- ☐ **Pocket Tool Guide.**

Mathias KLEIN & Sons

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge, $2.00.

Positions Wanted (full or part-time salaried employment only), ½ the above rates, payable in advance.

(*See ¶ on Box Numbers*)

Proposals, 40 cents a line an insertion.

INFORMATION

Box Numbers in care of any of our New York, Chicago, or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns — 30 inches— to a page. E.W.

Copy for New Advertisements Received Until Monday 10 A. M. for the following Saturday's Issue (*published every other week*)

POSITION VACANT

EXECUTIVE ELECTRICAL ENGINEER for a manufacturer of small electrical machinery such as relays, switches, transformers, motors, etc. Capable of supervising department. Age 30-40. College graduate. Excellent opening. Write complete details, send photo. E. K. Bixby Employment, 704 Brisbane Building, Buffalo, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS. $2,500 to $25,000. This thoroughly, organized advertising service of 29 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 262 Delward Bldg., Buffalo, N. Y.

EXECUTIVES AND TECHNICAL MEN. Contact employers for positions through our confidential and effective methods. We negotiate preliminary overtures. Established 24 years. Inquiries invited. H. H. Harrison, Director, The National Business Bourse, 20 West Jackson Blvd., Chicago.

POSITIONS WANTED

(*See also "Selling Opportunities Wanted"*)

ELECTRICAL ENGINEER, licensed four states. Extensive and varied responsible engineering, construction, and operating experience with four large utilities. Specialized on distribution, transmission and substations. Desires position as engineer or superintendent. PW-625, Electrical World, 330 W. 42nd St., New York, N. Y.

ENGINEER SUPERINTENDENT 16 years experience, design, construction, operation, Diesel, Hydro, steam plants and systems. Familiar public relations, industrial problems seeks new connections Superintendent Municipal System. PW-574, Electrical World, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

METER ENGINEER AVAILABLE: Have first class Utility Service record. PW-630, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

MASTER MECHANIC: A-1 Mechanic with 18 years experience as mechanic and electrician in industrial and utility plants, experienced as foreman, seeks A-1 connection. PW-632, Electrical World, 330 W. 42nd St., New York, N. Y.

ELECTRICAL ENGINEER E.E. 12 years experience in designing, commercial and Industrial power and light systems, Overhead Distribution and Transmission lines, desires position with Public Utility. PW-633, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

SELLING OPPORTUNITIES

OFFERED—WANTED

Selling Agencies—Sales Executives
Salesmen—Additional Lines

OPPORTUNITIES WANTED

MANUFACTURER'S AGENT calling on industrial, electrical and aircraft manufacturers in New England, interested in acquiring exclusive representation for one additional account. Nationally known, established production materials, requiring engineering knowledge, preferred. MA-621, Electrical World, 330 W. 42nd St., New York, N. Y.

LIVE WIRE SELLING ORGANIZATION calling on electrical trade in New York City would like to take on additional specialty lines. Electrical engineers employed for quantity surveys. Trade references furnished. RA-631, Electrical World, 330 W. 42nd St., New York, N. Y.

FREE BULLETIN

NEW ILLUSTRATED bulletin of used and rebuilt electrical and power equipment. Write to Chicago Electric Company, 1314 W. Cermak Road, Chicago, Ill.

WANTED

WANTED
MOTOR GENERATOR SETS AND ROTARY CONVERTERS

We will buy outright for spot cash motor generator sets and rotary converters from 300 to 1000 K.W. 250-275 volt D.C. 2300 to 6000 volt A.C. Mail us your list of surplus equipment.

COAL MINE EQUIPMENT SALES CO.
Office and Warehouse Terre Haute, Indiana

When Writing Your Ad

Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column. The right is reserved to reject, revise or properly classify all Want Advertisements.

Proper Classification increases the possibility of Prompt Returns

Do "Searchlight" ads in ELECTRICAL WORLD get Results?

Judge for yourself:

POSITIONS WANTED:
Within 6 days after the dates of the issues containing the advertisements, replies were forwarded to box number advertisers seeking employment in positions ranging from designers of distribution systems to manager of a Utility.

POSITIONS VACANT:
Within 3 days after publication, replies were forwarded to box number advertisers offering employment ranging from positions in the meter, test and research departments of utilities and a manufacturer, to that of power sales engineer.

SELLING OPPORTUNITIES:
Within 5 to 10 days after publication replies were forwarded to box number advertisers offering or wanting additional lines and to an equipment manufacturer in search of a Sales Manager. (Additional replies were forwarded these advertisers over periods ranging from 3 weeks to two months after the appearance of the advertisements).

EQUIPMENT WANTED:
Within 3 days after publication—and up to 2 weeks later—replies were forwarded to box number advertisers in the market for transformers and for an engine-generator set with switchboard.

Can "Searchlight" Serve You?

Are you seeking, or offering, an Employment, Equipment or Business Opportunity in the Electrical Industry? You will find advertising it here a speedy, inexpensive and efficient medium for bringing it to the attention of over 16,000 Subscribers to Electrical World.